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THE MENTAL HYGIENE CAMPAIGN AS SEEN BY AN OUTSIDE OBSERVER.

BY BRONSON CROTHERS, M.D., BOSTON.

THE National Committee for Mental Hygiene is conducting a campaign which should arouse the active interest of the whole medical profession. The enormous importance of the problems involved has been brought home to a considerable portion of the public, whose interest was shown in crowded meetings during the most inclement part of last winter. Doctors are not entitled to an attitude of detached interest or of indifferent acquiescence. A public health movement of great importance is under way and it is the plain duty of physicians to formulate a definite opinion.

The evidence upon which such an opinion can be based is readily available. The Committee has published for about six years a quarterly magazine, *Mental Hygiene*, in which original articles are supplemented by admirable reviews and abstracts. With the files of this journal as a starting point it is possible to select essential collateral reading without going too deeply into technical psychiatric and psychologic literature.

Any attempt to record the result of such a survey of the Mental Hygiene movement as a collective abstract would be sterile, as the fields covered include practically every activity of human life. It is an interesting exercise, however, to attempt to formulate an individual reaction to such a series of fascinating stimuli. Naturally such a method of review is open to all sorts of objections. Of course, the result represents merely a point of view, dependent on prejudice, selection and various other unscientific foundations, but it has certain merits, which the more conventional collective abstract cannot have.

The challenge to the medical profession is a definite one. Some of the psychiatric and psychologic leaders feel that a very large percentage of all mental disorders, by one speaker placed at 50%, are preventable by technic now available. The tremendous burden of deficiency, delinquency and insanity is hardly realized except by special students of the problem. If physicians are neglecting opportunities for effective treatment, they are thoroughly blameworthy if they do not at once make sure that those influenced by them understand the new possibilities. However, before acknowledging error it is only sensible to subject the whole matter to careful examination.

The active work of the National Committee is obviously under the control of psychiatrists and psychologists. Further, it is clear that these men represent the best in their fields. Quite naturally, some of them appear not to encour-

age other groups to share the responsibility of leadership. This distrust of other people is clearly formulated in several articles. When leadership in a movement is so limited and so jealously guarded it is entirely proper to search for reasons.

Obviously if Mental Hygiene is a pure science the control must rest with the originators and the practitioners of the science. That it is a distinct science is stated by Dr. L. F. Barker in the Presidential address at the tenth anniversary of the Committee. Under such circumstances it is open to the rest of us to take it or leave it, but it is impertinent to try to break into any active participation in its direction, unless we are asked.

But apparently there is no general agreement that Mental Hygiene is a separate and pure science. Many active members of the Committee regard it rather as an attempt to coordinate every effort being made for better mental life. Under such a definition every one of us who is interested in education, religion, politics or medicine, is, according to our lights, a mental hygienist. From this point of view we have rights in the selection of leaders. If the psychiatrists and the psychologists as a class show themselves wiser and more resourceful in dealing with the problems of the human mind than other men, we may look to them as chosen and not as self-appointed leaders.

As far as I am concerned, I cannot take seriously Mental Hygiene as a new science and I shall consider it as an attempt at correlating all the various activities aiming at better conditions and at formulating a plan of action.

From this point of view I at once admit the validity of the psychiatric and psychologic claim to leadership in the treatment and diagnosis of recognized mental disturbance, including deficiency, delinquency and insanity as well as disabling or disturbing neuroses. When I accept this limited leadership it means that I will use what influence I have in support of provision of such diagnostic clinics as may be needed, such psychologic studies as may help in the recognition of feeble-minded in the schools, and whatever psychologic or psychiatric investigation may be of help to the courts. Moreover, as a natural consequence of this attitude, I will try to study patients in such a way as to recognize psychiatric problems. Naturally recognition will lead to efforts at logical treatment or reference to experts in psychiatry or psychology.

However, the literature under review contains much that shows that certain mental hygienists aim at far more than the detection and treatment of mental disorders. Some of them go so far as to include common sense and normal in the quotation marks of doubt and derision. To these gentlemen the field of activity is broadened to include us all. Naturally they view children as the rough material from which neurotic and badly adjusted adults will develop.

As I see it, the non-psychiatric doctor regards the psychiatrist as a specialist in insanity and the psychologist as an academic seeker after rather obscure data. Such an attitude is entirely unnecessary, but the fault lies with some of the experts as much as with the rest of us. As long as this attitude is maintained everybody will be working at cross purposes.

For my own part, I have got a good deal of satisfaction from a working classification which fits most of the experts of my acquaintance.

By far the biggest group are broad-minded, hard-working people who talk reasonably about the problems that interest them. Their methods are perfectly logical and they claim no immunity from criticism. Naturally such people are able to study personality with great benefit. Where the worst of us dismiss a "nervous child" with routine advice as to rest and discipline and give the mother a prescription for nux vomica and bromides, the wise psychiatrist settles down with every one concerned. His essential technic consists of stimulating listening. He does not "take a history" from the mother, but he finds out what influences have acted on the child, what sort of interests he has, how he plays, what he does in off hours, how he gets along in school. He also, as a part of his study of the child, gets a clear idea of the whole family, the school teacher and the nurse. Much of this information is obtained by carefully trained social workers. The physical examination and perhaps a formal psychological test rule out certain defects.

Then, on the basis of this careful, painstaking procedure he suggests and supervises a course of action. The patient is taught to take an active part in his own cure, instead of being regulated and drugged. Naturally the result depends, largely, on the wisdom of the psychiatrist. On the face of it it is clear that no one capable of utilizing a method so time-consuming is likely to lack patience and he is almost certain to possess wisdom.

Another group, on the whole, I think, less efficient, shut themselves up with their patients and work along purely Freudian lines. The procedure is far more obscure and discussion is curiously difficult. If Dr. Freud and his disciples had not succeeded in making best sellers of medical text books, there would be little to justify amateur discussion of a highly complicated technical procedure. However, I feel that Freudians as mental hygienists have a claim to separate consideration.

A third group, whose procedure is simplicity itself, have assumed a rôle of great prominence. The more extreme advocates of Binet-Simon tests have a conception of life which seems to

me grotesque. If the mental testers of this type really represented psychology I should be entirely willing to get on without psychology, for reasons to be given. The claim to immunity from outside criticism practically eliminates their method from consideration as a part of true mental hygiene. This view is apparently backed up by most psychiatrists and many psychologists who regard intelligence tests as of limited value in certain fields. I shall discuss only the extreme advocates of "mental age." The rest of the psychologists range from them to quiet and useful students.

A fourth nondescript group includes a certain number of scientists whose interests only casually touch clinical medicine or mental hygiene and a large number of enthusiasts who use methods with more than a little suggestion of the occult.

As far as the National Committee is concerned, the strength of the movement lies in the predominance of the sane, vigorous students of human nature who are quite competent to handle the various complicated technical methods of modern psychiatry and psychology. The weakness, if there is any, is the enthusiasm of certain men who are so fascinated by technic that they are willing to attempt to popularize technical methods, which, taken from their place as details of procedure in a wise and patient investigation by experts, are subject to serious misuse. When a speaker suggests that 50% of mental disease is preventable by early attention to "conflicts" the listener may well inspect his evidence and examine his credentials.

Under guidance of the best, what may we expect from Mental Hygiene? In answer, the propagandists point to the anti-tuberculosis movement as an example. This analogy deserves more than casual attention.

The present programme of the various anti-tuberculosis agencies is a perfectly definite one. In the first place the disease, however protean its pathology, is due to a single group of organisms.

The prevention of tuberculosis depends on avoidance of infection or on developing or maintaining resistance. The signs of the disease are recognized, on proper examination, while the malady is still curable. The means of treatment are, to a large degree, well understood.

The leadership of experts is accepted because all of us are able to understand the methods by which they come to conclusions, even though we may be ignorant of details of bacteriology or pathology. Many of the bits of technic are carried out by the State or under its supervision. Some of the methods have received the sanction of the law and are enforced by the police.

When we compare this well formulated campaign with the problems confronted by the mental hygienists we see more points of difference than of likeness. For mental disorders may be the result of infection with any one of a number of organisms, of dissatisfaction with environment, of heredity, of accident or of endocrine disturbances—to mention only a few causes.

The prevention of disorders of the mind obviously involves the coöperation of every agency interested in human welfare.

The task of finding a starting point is a hard one. Various methods are possible. The mental expert can focus his attention on recognized mental disorders and try to educate people to regard these disorders as curable diseases, not as disgraces. As soon as this point of view is accepted, earlier diagnosis of psychoses and deficiency, with adequate care for less advanced sufferers, would naturally follow. Or he can approach the subject in a different way and lay stress on the fact that most preventable mental diseases begin in childhood. From this point of view he will regard preventive psychiatry as education in its broadest sense. Obviously he can combine both points of view, but, if he does so, he leaves himself open to challenges as a leader of education, to which, as a therapeutist, he is not liable.

The present campaign involves all these aspects. The psychiatrists and psychologists who direct the work of the National Committee for Mental Hygiene have challenged not only our methods of dealing with disordered minds but our methods of bringing up children.

Such a challenge can be considered only in sections. I believe it is entirely fair to eliminate any discussion of the treatment of developed disorders of the mind from discussion, not because it is not important, but because I yield absolutely to the authority of experts in these matters.

When it comes to acknowledging the right of these experts to supervision of the life of "normal" children (the quotation marks are the psychiatrist's), I do not feel so diffident.

Parents see more of individual children than any psychiatrist who is not also a parent. Teachers, pediatricians, scout masters, and any number of others see more children than any psychiatrist. On the face of it, the knowledge of children's minds is not confined to any one group.

The wise psychiatrist or psychologist can obviously help a lot. There is no valid reason for supposing that he sets himself up as more than a competent adviser on certain problems of childhood. The trouble is that a few do claim precedence over teachers and other veterans.

The first group of extremists are followers of Sigmund Freud. Over and over, these men denounce almost everyone else as mediaeval and incompetent. They are now trying to popu-

larize Freudian technic. Whatever else they do, they must be causing great agitation at the headquarters of the Committee. Certainly they are causing a variety of emotions among the rest of us. On the whole they add enormously to the gaiety of life as they discuss with pompous and astonishing vocabulary every subject from humor to Lady Macbeth. As the *enfants terribles* of Mental Hygiene they have a striking rôle.

The dilemma in which the Freudian finds himself is an interesting and difficult one. If he confines his efforts to individuals and uses the Freudian technic to help those seeking his personal assistance, he limits his field enormously. A very few patients will absorb all his time and energy. On the other hand, if he attempts to spread the ideas formulated by Freud he lays himself open to most serious dangers.

In order to understand Freud one must study with great attention a most complicated series of theories. Every Freudian warns the novice that misinterpretation at the start is to be expected. In fact, the initial refractory stage, otherwise, I believe, known as "resistance," is one of the strongest arguments for the truth of the theory. Between doctor and patient this resistance can be overcome, but it often takes time. In every case it requires considerable personal study before complete confidence allows utter frankness. The quality of this frankness astonishes almost everyone. It is literally absolute.

The mental hygienist cannot possibly reach the large audience which must be influenced if propaganda is to be effective, by any such methods. Certain writers and speakers, therefore, have attempted a formidable task. They apparently guess at the probable average "resistance" of their audience, and temper their frankness to it. The result appears to be bizarre. The only effect on a certain number is intellectual disgust. Naturally the group who react in this way include many who need help tremendously. They tend to dismiss mental hygiene without a blessing. Another group learn that words, hitherto spurned as obscene, are entirely scientific. This fascinating discovery leads to an absurd misinterpretation of an important technic, as well as to injudicious and persistent conversation of a highly objectionable type. Here and there, doubtless, a student may be urged to follow the difficult road to real understanding.

Such an interpretation may be entirely unfair, but for the last two years I have tried with great earnestness to find a medical student or a layman, not specializing in psychology or psychiatry, who had a working knowledge of the difference between repression and discipline, between fantasy and imagination, between libido and ambition, or between erotism and sensuality.

This general failure to understand a philosophy as difficult as that under discussion seems to me to show that efforts to propagate it by elementary discussions are quite futile. In the mothers of children, half-knowledge of this sort has led, in many cases, to complete lack of faith in everyone having to do with the child.

Certain books which seem to me in the highest degree unfortunate have been published. The entirely false impression they create is obvious. For example, a few years ago von Hug-Hellmuth's "Mental Life of the Child" appeared with an appreciative foreword by its translator, one of the most admirable medical philosophers of the time. Later on this volume was reviewed, with some misgivings, but with considerable approval, in *Mental Hygiene*. I quite realize the unfairness of picking out details, but when within the first few pages one finds that the new-born baby scratches itself, showing masochism, scratches its grandmother, showing sadistic trends of thought, and later enjoys sucking its finger because the smell of the softened skin has an odor suggesting the genitals, it is hard to read dispassionately. For one thing, Sherrington showed us, long ago, far more sadistic or masochistic trends in spinal dogs, who can hardly be supposed to harbor erotic ideas, and Head and Riddoch demonstrated undoubted sexual reflexes in men with complete transections of the spinal cord. Yet reviewers regard this book as valuable, though they naïvely suggest that readers should be able to discount the overemphasis in sex.

More popular volumes written by important and active members of the Committee are full of auto-erotism, mother-complexes and the rest of the Freudian vocabulary.

Without presuming to express any opinion on Freudian technic in its therapeutic aspect, I do feel that it is proper to express a deep distrust for any popular movement which attempts to spread its principles among laymen. For one thing, as far as I know, it is not accompanied by any well-formulated plan for teaching sex hygiene. Without rational sex teaching the emphasis on sex must, I believe, be disturbing without being helpful.

Another conspicuous recent contribution to mental science is the standardized psychological test of intelligence. After wandering for months in the confused fields of Freudian philosophy, conscious all the time that if I only understood I could probably get a flood of light, and feeling restless at being unable to follow language which apparently was plain English, it was delightfully refreshing to get on firm ground again. The problems of human existence were, after all, quite simple. A standard textbook on psychological tests gives the following summary of most of life's problems in terms of intelligence:

"Morality depends on two things: (a) the

ability to foresee and to weigh the possible consequences for self and others of different kinds of behavior; and (b) upon the willingness and capacity to exercise self-restraint. That there are many intelligent criminals is due to the fact that (a) may exist without (b). On the other hand, (b) presupposes (a). In other words, not all criminals are feeble-minded, but all feeble-minded are at least potential criminals. That every feeble-minded woman is a potential prostitute would hardly be denied by anyone. Moral judgment, like business judgment, social judgment, or any other kind of higher thought process, is a function of intelligence."

Having formulated an almost too simple explanation of ethics the author goes on to his methods of classifying intelligence: "The standardized tests have already become and will remain by far the most reliable single method for grading intelligence," and "without question the improved Binet tests will contribute more than all other data combined to the end of enabling us to forecast a child's possibility of future improvement, and this is the information which will aid most in the proper direction of his education."

To be sure, the author makes a few half-hearted reservations, but it is impossible for me to believe that he does not feel that the solution of the problems of life are largely dependent on the Binet-tested intelligence of the American people. However, in one of the dogmatic perorations which make his introductory chapters read like a book of directions on salesmanship, he says: "Binet testing is destined to become universally known and practiced in schools, prisons, reformatories, charity stations, orphan asylums, and even ordinary homes, for the same reason that Babcock testing has become universal in dairying. Each is indispensable to its purpose."

This is a statement I can agree to without much reservation. I know just enough about dairying to understand the value of the Babcock test. This test measures butter fat; it is, therefore, an accurate measure of the commercial value of the milk to the butter-maker, but it bears almost no relation to the value of the milk for other purposes. In fact, no wide-awake Board of Health would admit to sale any milk on the basis of fat content alone. Bacterial counts, methods of distribution and methods of preparation count for vastly more.

I agree that, for the present, the improved Binet test is a very useful short cut to knowledge of intelligence, but that it will keep its position seems, on general principles, uncertain, and that intelligence has any such vital relation to behavior, as is suggested, I doubt. Not that this opinion is of any interest to the author quoted, for he discounts it in advance. He says: "Criticisms of the Binet method have also been frequently voiced, but chiefly by persons who have had little experience with it, or by those whose scientific training hardly justifies an opinion. It cannot be too strongly emphasized that eminence in law, medicine, education or any other profession does not of itself enable anyone to pass judgment on the validity of a psychological method."

Under such circumstances I prefer to leave the Binet test where its champion has put it: with the Babcock test. At least no dairyman has challenged the right of doctors to judge medical values in his business, and if he did the law tends to recognize the medical opinion.

The quotations are not from a member of the National Committee, but they show a point of view which is too prevalent.

The term "mental age, in my opinion, is exasperating, and it is used over and over in the mental hygiene literature. The words "mental age" really mean the figure obtained by the Binet test or by some comparable procedure. Before I should be willing to listen seriously to any psychologist as a mental hygienist, I should demand proof that he used some other words. All that the psychologist has a right to mean by mental age is a more or less incomplete judgment of the level of intelligence. If, in his opinion, "intelligence" covers "mind," we ought to know it; if it does not, he is guilty of extraordinary looseness in the use of language—which, I believe, makes him a dangerous propagandist.

Most of the mental hygienists have serious doubts about the validity of the extreme psychological point of view. For instance, Dr. W. A. White, an important member of the National Committee, uses the following words in concluding a plea for a more or less Freudian conception of mental hygiene: "I am minded at this point to compare with the broad behavioristic program that I have indicated, the restricted scheme that is spanned only too often by the Binet-Simon scale. This scale, as devised by its originator, may be a very valuable tool in the hands of a skilled observer, but as the 'be-all and end-all' of child psychology it may become quite as vicious in its results as the fatalism inspired by the false theories of heredity I have already mentioned."

Abundant testimony from psychologists is also available to contradict the conclusions arrived at by the author first quoted. My point is, not that most psychologists are fools, but that we must bear constantly in mind that they are pioneers and enthusiasts. The virtues of the effective pioneer rarely include reticence or understatement. Quite unconsciously the joy of discovery often forces announcement before the finders know exactly what they have found.

At present psychologists are constantly finding new methods. I can see no possible reason for believing that they are in a position to force their adoption. They are a vigorous, stimulating group, but they have no claim to immunity

from criticism. Certainly they criticise each other.

In addition to Freudianism and psychological testing there is a considerable literature on endocrinology, syphilis, heredity and so on. On these subjects doctors can be assumed to possess capacity for adequate judgment.

The followers of Freud and the extreme psychologic testers demand, first, unbounded respect for their knowledge, without criticism by those outside the fold, and second, loyal support of a program based on this respect. Support on any such basis is not demanded as far as I know by any other scientific men. It involves an element of faith, not really arguable. When an engineer presents plans for a bridge to taxpayers his plans are accepted and carried to completion, not because we know anything about the calculations of stresses, etc., but because we feel that if we cared to go into the matter we could check his calculations. In no other way, I believe, can continuous support be obtained, without calling on faith. When the Freudian regards vigorous antagonism as a proof of the validity of his views or the psychologist asserts his immunity to criticism, neither has any logical right to resent lack of interest or flat hostility.

The best of the mental hygienists see this clearly enough. On the whole they base their claim to attention on far more reasonable grounds. They study problems in a thoroughly admirable way. The wisdom and patience of such people as Dr. Healy in Juvenile Court work and Dr. Esther Richards in school and hospital, to mention only examples, show the tremendous amount of solid work that is being done. In neither of these people is there the least trace of blind devotion to technic. On the other hand, it is quite clear that the assets of the ideal mental hygienist consist of patience and wisdom to an almost abnormal degree. If the mental hygiene committee will guarantee a steady supply of such people the rest of us can leave details in their hands. If they propose to impose upon us lecturers on Freud and Binet testers we may well test their personnel, not by laboratory methods, but by such tests as will convince us of their wisdom and common sense.

My own belief is that mental hygiene by highly specialized technic is an inconceivable thing, on any large scale, because I see no reason to suppose that a sufficient number of wise and patient people will devote their lives to psychiatry or psychology to control elaborate technic reasonably.

At this point it is of interest to quote Dr. Adolph Meyer, one of the true leaders of rational mental hygiene. In a presidential address to the American Neurological Association he said,—"There may be a few among us who feel that neurology should maintain its exclusive and dominant attitude by pointing to psychiatry as an extraneous and practically negligible asylum and sanatorium field, and that what can be handled at large should be handled under a vernacular of general medical and neurologic camouflage, sparing the public's feeling about the mind. Neither the conscience of the profession nor the state of public opinion can drift profitably in this manner. The most practicable step towards the solution of our problem is the rounding off of our training among ourselves and in our general medical curriculums by giving the student and worker good foundations for the simple and everyday tasks of psychology and understanding of ordinary personalities and their problems and needs. Let us realize among ourselves that neuropsychiatry stands for making organized and critical medicine a field of work with personalities as well as with part organs and functions, and that while there must be special workers devoted to special research in the special fields, no physician and no intelligent lay person can afford to disregard the gains by the modern readjustment; the recognition of life problems on the psycho-biologic level of integration, the promotion of a training in medicine dealing with the defective and unusual child, the growth of interest in the minor difficulties of human behavior and mentation and the humanizing of the work with all states and conditions of disease and mal-adaptation."

Dr. Meyer uses technical words, but a very few hours of reading allows anyone to understand exactly what they mean. He claims leadership, as an acknowledged expert, but he invites interest and discussion. Whether or not we follow him depends on our good sense and our industry. In any case he offers us a clear opportunity for sharing his information and learning his methods without giving up other lines of medical activity. Leadership of this type we can all accept.

The conclusions to be drawn from a review of such varied reading matter cannot be very definite. It is quite obvious that the irritating parts of the programme have demanded an undue portion of attention. However, this much can be stated,—

Mental hygiene, as discussed in authoritative literature, can be divided into two parts. In one are included plans for the earlier diagnosis and proper treatment of mental disorders. The authority of psychiatrists and psychologists to lead physicians in this part of mental hygiene is unquestioned and vigorous coöperation is properly asked.

The preventive side of the work concerns education, in its broadest sense. The upbringing of the next generation is not a matter for specialists alone. Teachers, clergymen, doctors and social workers act as advisers to parents, or act, under proper authority, as their deputies.

The danger, I believe, lies in mixing up these two parts of the programme. One is definite

and demands active support, the other is tentative and demands discussion.

The therapeutic side should be strictly supervised by experts. The preventive side can properly be discussed by anyone who cares to argue.

The weakness of the attitude of some mental hygienists, notably of the extremists among Freudians and mental testers, lies in a perfectly illogical demand for active support based on uncritical acceptance of disputed theories.

The duty of physicians seems to me plain. Mental hygiene is no revelation, it is open to intelligent criticism. Too many laymen regard it as a new faith. As physicians we should watch sympathetically, but critically, and we should guard against the well recognized dangers of enthusiastic and misguided lay application of medical methods.

Fortunately the National Committee has furnished, in accessible form, the literature which needs to be consulted. The examination of this evidence is interesting, profitable and easy. That some of it arouses discussion is inevitable. The National Committee, as a whole, should welcome professional interest. If doctors do not show interest it will be their own fault if they find that charlatans and unscrupulous enthusiasts are capitalizing the interest which the National Committee has aroused.

ILLUSTRATIONS OF DIFFERENTIAL DIAGNOSIS OF SOME TORPID STATES: THE THERAPEUTIC IMPORT.

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THE obtusion of consciousness is one of the earliest and most alarming phenomena which attracted the attention of students of disease. This is not the place for historical survey of the views regarding consciousness or its loss. For this presentation is to be confined to some aspects of differential diagnosis of some of the causes of impairment of consciousness. It is merely a survey of a few cases the superficial resemblance of which made the differential diagnosis all the more important.

CASE 1.—The first patient was a man of 22, seen at Spartanburg, with Dr. Fike. Three weeks previously there had suddenly occurred a feeling of stress in the eyes as if congested, and this was followed by an excited delirium. From this he had passed into a state of torpor. When I saw him this was less evident, but there was still some clouding of consciousness and slowing of responses and movement, and inability to understand unless remarks were quite simple.

However, physical examination showed absence of left achilles reflex, diminution of the right adductor reflex, a weakness of right internal rectus, an impaired diadochokinesis, slight jerky tremor in movement, a dull facies, and wide and sluggish pupils. These signs, in conjunction with the rapid onset, the delirium, and the torpidity, pointed to encephalitis as the possible diagnosis. This opinion was confirmed by the further progress of the case, the patient markedly improving.

This case must be contrasted with the young man now presented.

CASE 2.—Here one notes the bent attitude, stooped shoulders, with the head poked forward with a set and staring look, the shortness of the steps in walking, the lack of briskness of movement. Palpation discovers a rigidity of the limbs, trunk, and neck, and the patient complains of pain of the muscles above the shoulder. This state is the sequel of an encephalitis which had been diagnosticated as influenza some two years ago, in spite of the extreme lassitude and torpidity of the patient during the attack.

A number of cases of this kind are now being seen by neurologists. In some of them tremor is a marked feature. They present the syndrome produced by lesions in the region of the corpus striatum. Some physiologists believe that in this region the injury falls upon a system which governs the muscle tone, lesions of which produce both rigidity and tremor without preventing voluntary movement, which, however, becomes impaired on account of excess of muscular tension.

The resemblance of this syndrome to Parkinson's disease is very striking. The differential diagnosis is made by the onset of the former occurring after an acute illness, encephalitis, and by its comparatively rapid onset within a few months, while Parkinson's disease comes on insidiously during a period of years. Also, it is very rare except during the decline of life, whereas postencephalitic dystonia may occur before the prime of life, as in this case.

Much misconception has occurred from the use of the name "lethargic," as torpidity is by no means constant in encephalitis. Restlessness, on the contrary, almost always occurs, although it may not show itself for months. Wakefulness may be the predominant symptom and may last for months. Oculomotor paralysis may be absent even though the disease is a diffuse one. The frequency of its occurrence is due to the concentration of the oculomotor cells in nuclei and to the delicacy of their functions, the impairment of which is easily detected. On the contrary, a lesion of equal severity in the centrum ovale may show no focal signs. In some cases the functions are well performed until months after the development of the disease, when a Parkinsonian syndrome may appear, as in the foregoing case.

In the extremely torpid cases, catalepsy may occur, and in that case there may be a temptation to diagnose catatonic dementia precox. Careful neurological study should prevent this error, which the future course of the case will, however, rectify.

One has to differentiate encephalitis from such a case as the following:

CASE 3.—A man of 44 was seen with Dr. Steedly, also at Spartanburg. Four months before he had had an apoplectic attack, blood pressure 198, followed by torpor, headache in the left temple, aphasia, and weakness of the right side. In hospital the blood pressure fell to 140, and he improved, but relapsed three months later, with periods of semiconsciousness. Examination showed an extensor response of the right plantar reflex, absent right abdominal, diminished cremasterics, a weak grip of the right hand, diadochokinesis impaired on both sides, perseveration of movement, possibly some apraxia, substitutary aphasia and poor comprehension, though automatic speech was better than responsive speech, and neither showed dysarthia. The Wassermann reaction was negative and the spinal fluid contained 10 cells per cubic millimeter. There had been strabismus, and there was slight diplopia, but not hemianopsia. The visual fields were not examined at the time. Nothing abnormal could be seen in the optic disks and there was no pupillary deficiency. There was slight facial asymmetry. The most significant feature of the case was that on sitting up there occurred excruciating pain in the left temple, dizziness, and an aggravation of the speech defect. The man, in every way, except in his nervous system, was in the best of health, with a blood pressure never exceeding 140.

In so powerful a man, free of renal disease and hypertension, one had to reject the earlier diagnosis of apoplexy. The severity of the relapse and the lateralization of the physical signs were against a diagnosis of encephalitis in spite of the suddenness of the attack. On account of the one-sidedness of the signs, and their severity, the aphasia, the hemiplegia, the perseveration, and, above all, the localization of a headache, though aggravated by change of posture, the diagnosis made was a neoplasm of the left frontal lobe.

CASE 4.—Another variety of torpidity is exemplified in a woman of 45, seen near Rutherfordton, N. C., because of a coma with delirium which had occurred two weeks after a febrile attack with pain in the chest. She had lost appetite for a considerable time and had been severely constipated and had emaciated greatly. Examination found equal reflexes, reacting pupils, normal sensibility, dragging movements, and a lucid though very sluggish mind. The skin was rough and dry, and there was a branlike eruption on the back of the wrists; the tongue was scarcely red, but on inquiry the family doctor said he had remarked its extreme redness two weeks before. Inquiry showed that there had been a great lack of variety in her food for the preceding six months; it consisting almost entirely of grits and molasses, as she did not care for meat, and green vegetables were almost unobtainable. The absence of neurological signs in a case of acute onset, and the quality of the torpidity, quite unlike that seen in encephalitis, caused a rejection of that diagnosis, while the red tongue, the rapid emaciation, the eruption on the wrists and the history of dietary deficiency led to the diagnosis of pellagra, in spite of the absence of diarrhea.

OBTUSION FROM TOXICOSIS.

CASE 5.—*Post-Influenzal Confusion with Exhaustion.*—In May, 1915, a judge, aged 64, after a severe attack of influenza, remained very weak, confused in mind, and began to develop hallucinations and delusions of a vague character. Several consultants were seen without result, and he became weaker and less clear mentally. The patient was in a typical condition of mental confusion. Deep reflexes were very faint, abdominal reflexes were absent, there was plantar flexion. There was no paralysis and no anesthesia, so far as could be ascertained. The optic disk was not edematous and showed no arteriosclerosis, but the superficial vessels had thickened coats, though the heart was small, the apex reaching only to the lower border of the fourth rib, one inch inside the nipple line. Systolic blood pressure was 102, the diastolic 60. The kidney function had been ascertained by Dr. A. Hooe to be normal, phthalein appearing in ten minutes, to the amount of 30 per cent. and 34 per cent. in the first and second hour, respectively. But there was a large quantity of indican and a slight trace of albumin.

The patient was taking the following diet and medication: 2 A. M., beef juice; 3.20, ammonia; 4, red solution potassium iodide; 5.30, grapefruit juice; 6.15, three tablets, egg, whiskey, milk; 7.30, ten drops adrenalin solution; 8, ten drops solution iodide of potassium; 10.20, soft toast, coffee; 11.15, three tablets—caffeine, strychnine, spartein; 12, ten drops B. P.; 12.30, ten drops solution; 1.30, beef tea; 2.30, ammonia; 3.30, three tablets; 4, custard, cream; 4.30, ten drops B. P.; 4.45, ammonia; 5, ten drops solution; 7, egg, whiskey, milk.

I consider this a case of acute exhaustion psychosis, partly toxic in character. The treatment prescribed was embodied in the following report to his physician:

As the patient is suffering from exhaustion, stimulants are contraindicated as the tired organ is incapable of further response to them; therefore, I think it wise to omit caffeine, the secondary effects of which increase the exhaustion.

Strychnine should not be further given either; for it merely increases the discharge that is the exhaustion of energy of medullary neurones.

Spartein is a nerve-muscle poison, the effect of which in improving cardiac activity cannot be maintained for long without greater nutritional capacity by this patient.

It is true that an occasional case of paresis very rarely has as low a lymphocytosis; but never during an acute attack of the period simulated by this patient.

I see no advantage in the iodide of potassium. Furthermore, the basic element of this is a strong cardiac depressant. Nor should I give the bromides during the effort to build up the patient, as they diminish metabolic processes and diminish resistance. Ammonia should be kept for emergencies only, as its effect is evanescent.

The régime I prescribe is as follows: 6 A.M., five grains of sodium bicarbonate in four ounces of hot water; 6.15, one orange; 6.30 breakfast, cereal and milk, one egg, crisp bacon; 8.30, massage, consisting of slow, deep pressure without friction; the purpose of this is to increase the *vis a tergo* of the circulation and thus aid the heart by saving its *vis a fronte*. Sleep if possible.

On waking, about 9.30, five grains sodium bicarbonate in four ounces of water; 10 to 10.30, lunch—one banana, cereal, and milk; 12 to 12.30, massage, sleep; 2 to 2.30, dinner, meat and potatoes, green vegetables; 4.30, massage, followed

by five grains sodium bicarbonate in four ounces water; 6.30, supper—unpolished rice and milk, one banana. Between that and midnight, massage again when the patient is awake. For midnight lunch, Graham crackers and milk are desirable. The quantity of milk at one meal should not exceed five ounces. After meals the patient should be given one capsule of "phytin," an organic phosphorus preparation of the Society of Chemical Industry of Basle.

Beef-tea and gelatin should be omitted as containing too much excrementitious materials, which are cardiac poisons. Coffee and tea should be omitted also. A small piece of bread, with or without butter, may be taken with each meal if desired. Water should be the drink, and should be given about one hour before each meal, but should not be restricted to that time if the patient desires it at any other.

The adrenal principle should be continued; and I think it is better given as the dried gland, say three tablets a day to start with. I think that its effect might be improved by being taken along with 1 tabloid of "hormotone."

If this diet is found to be too heavy, diminish the quantities at the commencement. If the patient suffers from the heat, cool sponging should be beneficial; and in any case its effect upon the innervation of the vascular system is usually most beneficial; the water should be used lukewarm. The best cereals to give are puffed grains, with an occasional change to oatmeal and the brown prepared wheats, such as Ralston's. If the patient should desire any one article of food, let him have it occasionally.

When these measures were carried out, improvement was rapid; so that in four weeks the patient was able to be about, and the following term took his place on the bench, and remains well at this time, seven years later.

Case 6.—*Marked Confusion Due to Metabolic Migraine Resembling Petit Mal.*—A bacteriologist, aged thirty, was referred to the writer in the spring of 1912, because of attacks he called "bilious" (but not preceded or accompanied by constipation), which produced headache, preceded by numbness and pricking in the fingers, followed by dizziness, mental confusion, and foolish talk of paraphasic type, without loss of consciousness. These attacks had occurred every two or three months since the age of twenty-two; they were of short duration; there were no scotomata, but they were formerly accompanied by vomiting. The headache was of the splitting kind, lasted all day, and was followed by dullness and slowness of thought the day following. The capacity to concentrate his thoughts was increasingly impaired even between the attacks. He was at times irritable. He had no bad habits, and apart from these attacks he was well and strong. He received a blow on the side of the head when a boy, and there was still a dent in the left parietal region, upon which side the headache most often occurred. He had a large appetite, which he said he controlled, but he ate meat thrice a day, although, he said, sparingly. The blood pressure was not raised, and reflexes and sensibility were normal.

Treatment and Progress.—He was given the "low-protein standard" diet. He wrote me the following winter: "Since I have reduced the amount of protein in my diet and increased the quantity of vegetables, I have had no recurrence of these spells." His physician informed me that he remained well over three years later.

ENDOCRINE TYPES OF TORPIDITY.

Case 7.—*Hypoadrenia.*—Some years ago a mechanic of 48 was seen with Dr. W. Carr, Jr. He was quite unable to work, because of extreme depression, slowness of thinking, and finally a state of torpidity from which he could scarcely arouse himself. Examination showed loss of weight, sluggishness of reflexes, slowness of movement, and difficulty of cerebration, along with a very sad feeling tone. The pulse was slow, and the blood pressure below 90. The clinical picture was typical of hypoadrenias, and the diagnosis was confirmed by recovery within a week by attention to general hygiene and the giving of adrenal substance.

Case 8.—*Pre-Adolescent Hypopituitarism.*—A girl, aged eleven years, was brought by her mother, a doctor's wife, because of loss of interest in her lessons, of which she had previously been very fond; grimacing of the face in spite of all correction; equivocation and fibbing in attempts to evade her duties; and greediness amounting to gluttony. She had always been a stout child, but had become enormously so during the preceding year or two. Exploration of a possible psychological cause for this change of behavior was fruitless; so psychomotor exercises were begun for the facial tics. The only effect of these was to arouse the patient's resentment, and they were not continued. Some time after, great somnolence manifested itself, the child becoming very lethargic and even dropping off to sleep in the middle of a task or at the table for a few minutes. This directed attention to the function of the pituitary gland; so this was immediately explored by the levulose test. As this showed great increase of the tolerance of the system to large amounts of sugar, 300 grammes, it was decided that the pituitary gland was functioning insufficiently; great increase of weight, torpor, psychic inadequacy, and its attendant changes in behavior being symptoms of lack of pituitary secretion. Feeding with increasing doses of pituitary gland was at once begun.

The child recovered completely in a few months, and after the onset of puberty was able to dispense with the pituitary gland, and now 10 years later, is active and comparatively thin.

Case 9.—*Hypothyroid Torpor.*—A case mentally even more sluggish was seen in a woman of 50, but in contrast to the preceding example she had gained 30 lbs. in weight in the course of a few months, the voice had become coarse and rough, there had been progressive and constant loss of hair, the eyebrows had become scanty, the urine less abundant, and she showed the characteristic thickening at the base of the neck, low temperature, slow pulse, and rough skin of hypothyroidism—a diagnosis confirmed by her rapid recovery when thyroid substance was given her by the mouth.

PSYCHOGENETIC OBTUSION.

The torpid state has been observed as a reaction to an over-difficult situation. Thus one of my friends, an eminent inventor, who keeps up a private laboratory for his amusement, finds that whenever he fails to solve a problem upon which he has been working for some hours he is not only disappointed but has an irresistible inclination to sleep, which he indulges, although it can be overcome with a powerful stimulus.

Again, a young lad of my acquaintance when faced with something which he finds unpleasant

feels himself overcome with a species of lassitude and complains of being very tired. This state is very easily dissipated by either changing the mental attitude toward his task, or by permitting him to do something else. In some instances, however, lassitude will persist for a considerable time.

THERAPEUTIC IMPORT.

Although curious and interesting, relation of these cases would have little practical import for healing of the sick did differential diagnosis not provide an avenue to treatment of each case leading to improvement and recovery. Thus, the case of acute encephalitis was spared the risks of exploratory craniotomy, avoided an unnecessary saturation with antilueties, and he was spared the expense of a rich diet.

The patient with post-encephalitic dystonia is saved from wasting his money upon useless manipulations whether they call themselves chiropractic or not, and is spared the annoyance and expense of being baked in a vain hope of relaxing his over-tight muscles.

The patient with a tumor of the frontal lobe is relieved by an operation upon the skull; he, too, is spared the infliction of mercury and arsenicals.

The woman with pellagra escapes the madhouse, useless medication, futile exploratory operation, and is quickly restored by appropriate diet.

The young girl with pituitary disease is spared the stigma of a perverse character, the trying discipline of psychomotor reëducation, and the murdering of the digestive organs by so-called tonics. She was soon restored to effective living by proper opotherapy.

The man who at first sight seems a wreck of his former self is spared the all too commonly imposed trip to Florida, a long stay in a sanatorium, or a life of permanent invalidism. He, too, is quickly restored to effectiveness by proper opotherapy.

The woman who has become a burden to her household, and whose illness is compelling her family to face an entire readjustment of their lives, is restored to her former effectiveness as director of her household and companion of her husband and children, but only after the nature of her trouble is ascertained to be due to a mere deficiency of thyroid secretions.

Of the torpid conditions ensuing upon psychic causes, of which an example would take too long to relate completely enough, the therapeutic import of a correct diagnosis is just as great; for it is especially to these patients that have been misdirected so often medicinal and physical measures without efficacy in such cases. Strychnine, forced feeding, rest, change of scene, douches, massage, treatment by cults—all fail to reach the source of the disturbance. The inertia of cases of this kind can be quickly and infallibly removed, by proper psychic means, and by them only. For if other means, in some few cases, seem efficacious, it is only because of the psychic accompaniments which some of them sometimes contain, and which may accidentally happen to fit the particular case; whereas intelligent psychotherapy ascertains and measures the situation and then meets it with a sure hand.

Most gratifying of all, the distress and ineffectiveness due to psychic disadaptations are permanently relieved by the rectification of the patient's mental attitude and accompanying emotion, with a success nearly invariable where proper means are used.

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CONGENITAL MALFORMATION OF THE INTESTINE — ATRESIA AND IMPERFORATE ANUS.

A REPORT OF TWENTY-SEVEN CASES.

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Congenital malformation of the intestine, although not by any means a common defect, is of sufficient importance to warrant the attention not only of the practising physician, but of the laity as well.

Recently while assisting Dr. Wolbach in autopsies at the Children's Hospital, Boston, two cases of malformation of the intestine were encountered in a single week. The similarity of sex, nature of defect and operation, and the fact that both died on the fourth day, led to my studies of this particular form of defect; with the result, I was able to collect twenty-five unpublished cases from the Warren Anatomical Museum of the Harvard Medical School.

In view of the fact that text books on diseases of children, obstetrics, and systems of surgery mention the condition from their respective points of interest, it is the object of the writer not merely to place these cases on record, but to include in this study such available information, other than those that are obvious at birth, that may be of interest on the subject.

I am indebted to Dr. Stone of the Surgical Service of the Children's Hospital for the clinical data on the first four cases; and to the Warren Anatomical Museum for allowing me to use the specimens and records; also to Dr. Wolbach for the assistance he gave me in the preparation of these cases.

REPORT OF CASES.

CASE 1.—A-21-19.

Clinical Data: Baby L., male, age 2 days, was admitted to the Children's Hospital, Boston, with imperforate anus. Although no meconium was passed by urethra, the symptoms were not

urgent, as there was no distention or vomiting. The family history was negative; there being no miscarriages, syphilis or tuberculosis.

A perineal exploration was done, but the rectum could not be located. On the following day a colostomy was done, after which the patient showed marked improvement, but of short duration. His temperature varied from 97 to 102 during his stay in the hospital. He died on the fourth day, two days after the operation.

Pathological Report: Necropsy was performed 9 hrs. post mortem by Dr. S. Burt Wolbach and Dr. W. S. Quinland.

Anatomical Diagnosis: Imperforate anus, persistent cloacal duct, congenital absence of left kidney, hypertrophy of the right ventricle of heart, hypertrophy of adrenal (left), colostomy wound, perineal wound, acute peritonitis.

Body: The body was that of a newly born male baby, measuring 42 cm. in length. At a distance of 2 cm. to the right of the umbilicus was a colostomy wound 5 cm. long. This wound was closed by sutures except in its middle portion, where there was an opening 1.5 cm. long, through which feces could be expressed. In the perineal region a gaping wound 2 cm. long and 4 cm. deep was seen to enter the membranous urethra, instead of the rectum, which existed as a dilated sac high up in the pelvis.

Peritoneal Cavity: On opening the abdomen the stomach was seen to be distended with gas. The coecum and several loops of small intestine were deeply injected and matted together by fibrinous adhesions. The calibre of the gut was normal until the rectum was reached, where it became dilated to the extent of 7x5 cm., and communicated with the membranous urethra by an opening barely large enough to admit a small sized probe. The bladder was distended to its full capacity with dark brown turbid fluid, and its mucosa was deeply injected. Near the urethral orifice, two small openings were seen. One of these, situated somewhat to the right of the median line, communicated with the right ureter; the other, 1 cm. below and in the median line, proved to be a persistent cloacal duct. (Fig. 1.)

Other abnormalities present were a congenital absence of the left kidney and ureter. Hypertrophy of the left adrenal, which measured 5x4x.4 cm. A right kidney shaped like a mushroom with its ureter given off from the inferior (caudal) surface. The heart was flattened so that its transverse measurement was 4.5 cm. and its vertical 2.5 cm. A Meckel's diverticulum was present.

CASE 2.—A-21-20.

Clinical Data: D. M., male, age 3 days, entered the hospital with imperforate anus. He began to vomit greenish material at birth. His abdomen became distended, but there was no tenderness. His temperature varied from 97-101. The family history was negative, father, mother, and three other children being well.

A perineal exploration and colostomy was done. The rectum was not entered, and the patient died on the fourth day, 24 hours after the operation.

Pathological Report: Necropsy was performed 1½ hrs. post mortem by Dr. S. Burt Wolbach and Dr. W. S. Quinland.

Anatomical Diagnosis: Imperforate anus, patent cloacal duct, colostomy wound, perineal wound, acute peritonitis, acute cystitis. So nearly alike were the findings in this case to the preceding one, that a less detailed description is given.

Body: The body was that of a male infant 49 cm. long. The skin was lemon yellow. There was a colostomy wound 6.5 cm. long, and 4 cm. deep that terminated behind the neck of the bladder and 1 cm. below the dilated rectum.

Peritoneal Cavity: On opening the abdomen the intestine was seen to be deeply injected and covered with a viscous exudate. The stomach was distended. The lumen of the gut was normal, until the rectum was reached, where a dilatation of 6.5x3.5 cm. was encountered. This sac-like dilatation communicated with the prostatic urethra by a patent cloacal duct 2 mm. in diameter. (Fig. 2.) The mucosa of the bladder was markedly congested and oedematous. Other abnormalities were a bifid left thumb and much dense fibrous adhesions around the common bile duct.

CASE 3.—A-18-2.

Clinical Data: L. H., male, age 6 days, entered the hospital with persistent vomiting of dark foul material that started on the second day. The abdomen was markedly distended and tympanitic. The superficial veins of the abdomen were engorged, and active peristalsis could be seen through the abdominal wall. The external anus, which was patent, had many fissures around it. The family history was negative; father, mother and one other child were alive and well. An ileostomy was done, but the patient died very shortly after the operation.

Pathological Report: Necropsy was performed by Dr. S. Burt Wolbach.

Body: The body was that of a poorly nourished male infant measuring 54 cm. in length. At a distance of 2 cm. to the left of the umbilicus was a surgical wound 8 cm. long, with sutures intact.

Peritoneal Cavity: On opening the abdominal cavity, there was seen to be a complete break in the continuity of the gut so as to form a proximal and distal cul-de-sac in the middle third of the ileum. The proximal blind end was dilated to 3 cm. and had a surgical opening that was sutured to the abdominal wall. Connecting this proximal end to a collapsed similarly blind distal portion were two narrow glistening white cords of fibrous tisssue, each about 1 mm. thick and 3 cm. in length, and a portion of mesentery above. The distal part of the ileum was tightly contracted, but on incision was found to be

patent and empty. It led to a completely contracted coecum in approximately normal position. There was a normal appearing appendix coming from the posterior wall of the coecum. The ascending, transverse, descending colon, and sigmoid flexure and rectum were tightly contracted and empty, so as to resemble more nearly small intestine than large. This description of the defect is best illustrated in Fig. 3.

CASE 4.—A-16-4.

Clinical Data: S. B., female, age 3 days, was admitted to the hospital with abdominal distention and persistent vomiting of everything ingested since birth. No meconium was passed, although a patent anus which would not admit the tip of the fifth finger was present. Family history was negative. Father, mother and five children alive and well.

An enterostomy and perineal exploration was done. The rectum was, however, not entered and the patient died five hours after the operation. Here again, because of the close similarity of the defect in this case to that of the preceding, I shall only mention some of the more important findings.

Pathological Report: Necropsy was performed by Dr. Wolbach.

Body: The body was that of a female infant 43 cm. long, weighing 2400 grams. Above and below the anal orifice were surgical incisions 1 cm. long, and closed by sutures. An enterostomy wound 4 cm. long and 4 cm. to the left of the umbilicus was present.

Peritoneal Cavity: On opening the abdomen a defect quite similar to the preceding case was encountered in the upper third of the ileum. Following is a summary including the foregoing cases with twenty-three others collected from the Warren Anatomical Museum.

DISCUSSION.

Although there are various developmental defects of the intestine and its related structures, namely, atresia, stenosis, imperforate anus, diverticula and cyst, I shall attempt only to discuss those conditions encountered in the cases of the present issue. For convenience I shall begin with imperforate anus; not merely because of the clearer and more general conception of its occurrence, but it is the condition most frequently met, and that which is less likely to escape the immediate detection of the accoucheur.

Imperforate Anus: The embryology in this instance is interesting. Quoting Gaston[6]: "About the first month, the invagination of the ectoderm of the skin takes place on the ventral side of the embryo, opposite to the terminal portion of the cloaca, by which the ectoderm is brought into contact with the entoderm of the lower end of the intestine, the two layers becoming the cloacal membrane. When the cloaca becomes sub-divided into the urogenital sinus and the rectum, the cloacal membrane is correspondingly separated into the urogenital aperture and into the anal membrane. About the end of the twelfth week the anal membrane ruptures forming the anus." Imperforate anus, then, results from imperfect union between the rectum above and the posterior part of the cloaca common to the urogenital aperture and the hind gut below. The deformity exists in varying degrees. The anal aperture may be separated from the rectum by mesodermal tissue an inch or more in depth as a result of insufficient invagination of the ectoderm to meet the rectum, which may end blindly above or communicate with the exterior by some unusual opening. Cases 6, 12, 15, 16, 19, 20 and 22 fall in this category. Another type is where the embryonal anal plate persists without the slightest invagination of the skin in this region. See Cases 1, 5, 10, 11, 13, 21, 23, 24, 25, 26, 29.

In the presence or absence of an external anus, if for some reason complete separation of the cloaca to form the urogenital sinus and rectum does not occur, the latter opens into the bladder, or more commonly into the prostatic or membranous urethra if the child be a male. See Cases 1, 2, 10, 13, 14, 26 and 27; or the rectum may open into the vagina if the child be a female. See Cases 11 and 25. From these types of imperforate anus, it can readily be seen how seven of these cases might have gone unrecognized at birth because of the presence of an external anus that did not communicate with the intestine above. Still more unusual openings of the rectum have been recorded in the literature; among them being two extraordinary cases cited by Bushe where in the case of Dinmore's an infant in whom the inferior portion of the abdomen was badly developed had the intestine directed upward, and opened under the border of the right scapula; and to that of Bils, in which the intestine mounted from the pelvis, through the chest, into the neck, and opened on the face by a very small opening.

ATRESIA.

Although many hypotheses relative to the causation of atresia of the intestine have been propounded, among them being bands of adhesions, twists and bends of the gut, blocking of mesenteric vessels resulting in defective blood supply, etc., none of these seem to give a very satisfactory explanation for the complete break in the continuity of the gut in the small intestine. Primarily, the duodenum presents a well defined round lumen in embryos of about 7 mm. This lumen later becomes divided into compartments by septa of proliferating lining epithelium so that in embryos of about 14 mm. the lumen may be completely occluded. At 30 mm. the compartments begin to become confluent, and in this way a central lumen is re-established. The view most commonly held is that of Tandler[10] based upon the above briefly outlined embryology. Forssner[3] confirmed Tandler's views to the

. 1. Case 1. Ch. Hosp. A-21-19.—Imperforate anus, congenital absence of left kidney. Persistence of cloacal duct which enters bladder; on posterior wall median line, level of right ureteral orifice.

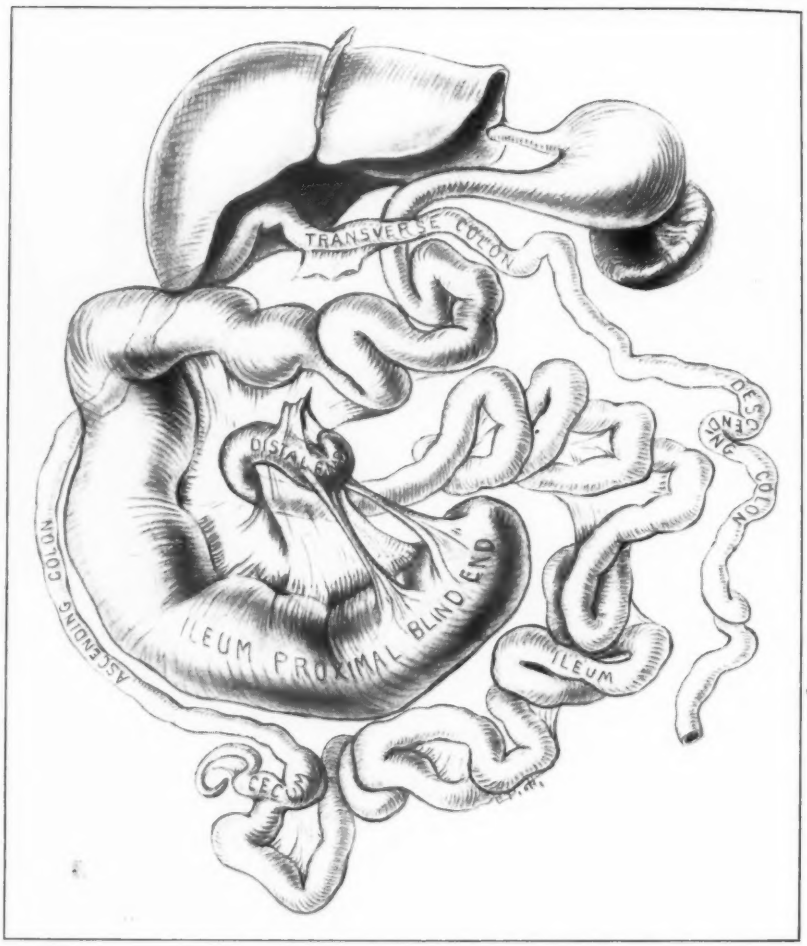

FIG. 3. Case 3. Ch. Hosp. A-18-2.—Congenital atresia in middle third of ileum, showing dilated proximal cul-de-sac and the contracted distal cul-de-sac attached to each other. The deformity falls in Group III (b) of Forssner's classification.

. 2. Case 2. Ch. Hosp. A-21-20.—Imperforate anus. Persistence of cloacal duct which enters prostatic urethra.

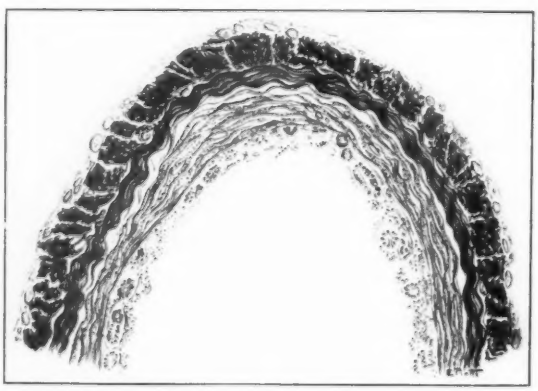

FIG. 4. Case 3. Ch. Hosp. A-18-2.—Microscopic drawing of a longitudinal section taken through the distal cul-de-sac, showing no variation of the coats around the blind end.

No.	Date	By whom presented	Sex	Malformation		Treatment and Result	Remarks
				Character-ization.	Anatomical Situation		
1	1921	Dr. S. B. Wolbach Dr. W. S. Quinland	Male	Imperforate anus.	No external anus. Rectum ends as cul-de-sac 7x5 cm. having small opening that communicates with the prostatic urethra. Congenital absence of left kidney. Three lobes to left lung.	Operation - Perineal exploration. Following day a colostomy was done. Died on the fourth day, two days after the operation.	Meckel's diverticulum was present. Patient showed marked improvement of short duration immediately after the colostomy. Autopsy showed acute peritonitis.
2	1921	Dr. S. B. Wolbach Dr. W. S. Quinland	Male	Imperforate anus.	No external anus. Rectum ends in cul-de-sac 6.5 x 3.5 cm. having small opening in prostatic urethra.	Operation - Perineal exploration and colostomy. Died on the 4th day, 24 hours after the operation.	Patient drained freely during the night following operation, but rapidly grew weaker. Stimulants were used without success. Autopsy showed acute peritonitis. Rectum not entered by perineal route. Bifid right thumb.
3	1916	Dr. S. B. Wolbach	Male	Atresia	Ileum ends in cul-de-sac in middle third. Remainder of intestine is tightly contracted.	Operation - Ileostomy. Died on 6th day shortly after the operation.	There were several small fissures about the anus.
4	1916	Dr. S. B. Wolbach	Female	Atresia	Ileum ends in cul-de-sac just below jejunum where it is 6 times the width of the large intestine which measures .7 cm. across. Anus is patient.	Operation - Enterostomy. Perineal exploration. Died 5 hours after operation.	Anus although patent, will not admit the tip of the little finger. Probe can be inserted through anus for only 1½ cm. The rectum was not entered at operation.
5				Imperforate anus.	Rectum ends blindly above anus. No external anus.		Museum specimen - No record.
6		Dr. S. E. Stone	Male	Atresia	Rectum ends in cul-de-sac 3 cm. above the anus which is of normal size.	Operation. Trochar was passed on the eighteenth day. Died on the 24th day.	Rectum and anus were separated by a small amount of tissue. No opening between bladder and urethra.
7	1895			Atresia	Duodenum ends in cul-de-sac 5 cm. wide. Shreds of mesentery connect duodenum with intestine below which measures only 5mm. wide. Constriction below pylorus. Esophagus dilated.	Died on sixth day.	
8	1892	Dr. Garnett		Atresia	Duodenum ends in cul-de-sac and is enormously dilated 6.5 cm. Rest of intestine well formed and collapsed. Blind end of jejunum .7 cm. wide.	Died on third day.	Child at term.
9	1889	Dr. H. E. Marion		Atresia	Duodenum ends in cul-de-sac and dilated 4 cm. Bile duct empties just below into otherwise well formed intestine.	Died on seventh day.	
10	1877	Dr. S. E. Stone	Male	Imperforate anus.	No external anus. Rectum opens into bladder. Ureters dilated and course along the outside of bladder to the penile urethra. Penis rudimentary, scrotum divided.	Died.	There was a structure corresponding with the seat of the verumontanum.
11	1877		Female	Imperforate anus.	No external anus. Rectum ends blindly with small opening into vagina.	Operation - Died.	
12	1877		Male	Atresia	Rectum ends blindly above the anal orifice from which it is separated by fibrous tissue.	Operation - Died.	
13	1877		Male	Imperforate anus.	No external anus. Atresia of rectum with opening in prostatic urethra.	Operation. Perineal exploration. Died.	
14	1877		Male	Imperforate anus.	No external anus. Rectum dilated and enters the membranous portion of urethra.	Operation. Perineal exploration. Died.	
15	1869			Imperforate anus.	Rectum ends in cul-de-sac a few cm. above anus.	Operation. On the 4th day a trochar was passed. Opening was enlarged. Died on the 6th day.	Meconium passed freely after the use of trochar, which passed through the surrounding tissue into peritoneal cavity.
16	1858	Dr. James Ayer	Female	Atresia	Rectum ends in cul-de-sac separated by narrow bands of tissue from anus which is formed.	No operation. Died on sixth day.	Second child in the family with atresia of the intestine. The previous one, a male, lived 8 days, during that time he passed meconium per urethra.
17	1858	Dr. Seaverns		Atresia	Anus. At birth a small probe only could be passed, but it became somewhat dilated later. Intestine was dilated above.	No operation. Died at 18 months	
18				Atresia	Duodenum, ends as dilated cul-de-sac 4.5 cm. wide. Not connected with ribbon like intestine of .5 cm. width.	No operation. Died on 8th day.	
19	1848	Dr. b. Portermay	Male	Atresia	Patent external anus that admitted the finger to a depth of half an inch. Rectum about 3 cm. above.	Operation. Anus was further opened by incision 1½ inches upward. Died few hours later	The intestine was not entered at operation.
20	1847	Dr. A.B. Moore	Female	Imperforate anus.	Atresia of Rectum, two above anus. Separated from 1 inch of rectum immediately above anus by less than an inch.	Operation. Trochar was passed through the anal plate for about 2 inches on the third day. Died two days later.	The trochar failed to enter the intestine.
21	1847	Dr. J. C. Warren		Imperforate anus.	Atresia of ascending colon. Coecum measures 5 x 3 cm. Attached distally is a blind atrophic end 3 x .6 cm, representing the remainder of the large intestine.	Died in a few days.	
22	1846	Dr. John Flint	Male	Atresia	Patent external anus with one half inch of intestine above. Upper intestine ran a straight course and terminated in cul-de-sac about 4 cm. above anus.	No operation. Died on the sixth day.	Operation was not done possibly because there was a patent external anus.
23	1839		Female	Imperforate anus.	No external anus. Atresia of rectum above the anus.	Perineal exploration. Died 17 hours after.	The posterior parietles of the vagina were extensively wounded, resulting in profuse hemorrhage. Intestine not entered.
24	1840		Male	Imperforate anus.	No external anus. Rectum ends in cul-de-sac a short distance above the anus.	No operation. Died on the fourteenth day.	The lower portion of the small intestine and the whole of the large were inflamed. Large intestine was ulcerated.
25	1839	Dr. Welker	Female	Imperforate anus.	External anus absent. Rectum ends in cul-de-sac about 4 cm. above anus, and communicates with upper posterior vagina by small opening.	Colostomy. Died at 3 months.	Two or three weeks before death the colostomy wound healed and feces was passed as before by the vagina.
26	1837	Dr. J. H. Lane	Male	Imperforate anus.	No external anus. Rectum dilated and ends in cul-de-sac with capillary opening into the membranous urethra.	No operation. The patient was kept under the influence of paregoric. Died on the ninth day.	Developed broncho-pneumonia as a terminal infection.
27	1810	Dr. W. S. Chamberlain	Male	Imperforate anus.	No external anus. Rectum ends in cul-de-sac with minute opening into the membranous urethra. Penis rudimentary. No scrotum.	Died.	No available record of treatment.

effect that a condition of more or less complete occlusion of the duodenum may persist in the human from the very early embryological stage (5 mm. to 30 mm. in embryos), in which it normally occurs, until birth. The persistence of the epithelial septa is followed by an ingrowth of mesenchyma. Forssner found such atresias in the human colon and esophagus. He confirmed Tandler's work. Kreuter[3] also finds it in the colon. Forssner[4] quotes numbers of authorities giving such epithelial occlusions of the intestinal tract in various animals,—fowls, frogs, guinea-pigs, rabbits, dogs, and swine. He confirms these findings in the normal embryo of man's duodenum, rats' and fowls' duodenum, as the above sequence in the development of the intestine. He gives the following classification of the defect.

Group I. Septa of mucous membrane (a) with epithelium wholly intact. (b) Loss of epithelium in places (irisform).

Group II. Blind ends connected with a strand composed of serosa, muscularis and submucosa. In the submucosa one finds (a) No epithelium. (b) Only an occasional epithelial rest. (c) A small epithelial tube joining the blind ends.

Group III. Free blind ends (a) Not attached to each other. (b) Attached to each other.

The etiological factor of intestinal atresia and stenosis is to be found in the embryonal occlusions. One can interpret the subsequent pathogenic development as follows. If the epithelial occlusion does not disappear when the fold-building process through the ingrowth of the mesenchyma begins, then the ingrowth of the mesenchyma into the epithelium occurs before the continuity of the tube is re-established. (A partition.) If the connective tissue bridge is thin, then it provides a membrane. If it is thicker, it becomes a cord. If the connective tissue bridge is not complete or is very delicate at one place so that it tears, an incomplete membrane is formed. Through modification occurring during fetal life the various forms of atresia and stenosis can occur. It is possible to have a malformation which originally was a stenosis develop into atresia, which accounts for the fact that meconium is sometimes found distal to the atresia, if such a defect is formed after the third month. Atresia of the esophagus is to be explained in the same manner, but in addition the very early communication between the esophagus and trachea must be taken into account. It is further stated, that the gut fails to expand owing to the large size and downward growth of the liver at this stage, and to pressure exerted by the mesodermal wall on the closed epithelial cord.

In order to determine as nearly as possible in my cases what histological changes had occurred in places where the gut was occluded, I made longitudinal and cross sections through the terminal portions of the proximal and distal cul-de-sacs of Kaiserling fixed preparations. The sections were stained with hematoxylin and eosin. Microscopically none of the sections showed any evidence of scarring in the coats, no intervention of fibrous tissue or proliferation of epithelium between the walls of the gut or anything that would suggest a healed inflammatory process. On the contrary, the mucosa, submucosa, muscle and serous coats were seen in longitudinal sections to course without any apparent variation in thickness from one wall of the intestine around the blind end, to the opposite wall. These observations, which are quite consistent with those of Forssner,[5] were best studied in sections taken from the distal cul-de-sacs where there was absence of dilatation. (See Fig. 4.) Sections taken from the proximal cul-de-sacs showed the above changes with less distinctness, due on the one hand to stretching of the coats, and on the other to a localized acute inflammation either as a result of accumulated meconium, or an enterostomy operation. In some of the cases the walls of this portion of the gut were definitely thickened and discolored dark red. Microscopically, sections from the thickened wall showed hypertrophy of the muscle coat and irregular losses of mucosa. Sections of bands of fibrous tissue (apparently mesentery) that joined the proximal and distal cul-de-sacs were also examined microscopically to determine if possible to what extent thrombosis plays in the formation of such defects; but no blood vessels could be found in any of the sections. From these observations and the works of other investigators, I am inclined to believe that the break in the continuity of the gut is due to embryonic arrest in development, rather than to some mechanical injury of which it may be the end-result.

OCCURRENCE.

Location: Atresia of the intestine may occur in any portion of the intestinal tract. In twenty of the cases herein presented it occurred in the rectum; once in the ascending colon, twice in the ileum (first and middle thirds), and four times in the duodenum. From so few cases as these, it is wholly impossible to arrive at any definite conclusion as to what portion of the intestine the defect is most likely to occur; yet, statistics record the majority of cases to occur in the duodenum and the jejunoileum regions. Just how many of these cases occur each year it is difficult to say with any degree of certainty, since it may be assumed that a few are likely to go unrecognized; but judging from the figures given below it may be concluded that the condition is one of the rare forms of congenital malformations. I am indebted to Drs. F. S. Newell, Boston Lying-In Hospital; J. B. DeLee, Chicago Lying-In Hos-

pital and Ross McPherson, New York Lying-In Hospital, for the following data. In the last 10,000 confinements at the Boston Lying-In Hospital, only one case of imperforate anus was encountered.

In 10,000 cases at the Chicago Lying-In Hospital two cases were encountered. In 50,000 cases at the New York Lying-In Hospital, there were 28 cases of atresia and imperforate anus; 24 of these were males and 4 were females.

PROGNOSIS.

The prognosis is usually grave on account of complications; hemorrhage, peritonitis and septicemia. According to Bevan,[2] because of the probability of an ascending nephritis developing, it is usually wise in these cases of imperforate anus where there is connection between the lower end of the rectum and the bladder, to be satisfied with a permanent colostomy opening, and not risk the life of the patient in an attempt to separate the rectum and the bladder. If, however, the child be a female, the prognosis is more favorable, particularly if the recto-vaginal opening is of fairly large size. Gay cites a case of Morgagni in which Tatonicus, a Jewess, passed all her feces by the vagina and lived to the age of 100 years. Of Dr. Ross McPherson's 28 cases, 17 died, 10 lived, and one was a stillbirth. Death occurs usually in 5 or 6 days if the occlusion is high up in the small intestine. Atresia and imperforate anus are sometimes complicated by other anomalies that may or may not influence the prognosis of the case. This depends largely on the location and extent of such a defect. See Nos. 5, 2, 10 and 27.

TREATMENT.

Surgical invention is the only treatment. Because of the variation in defect, the procedure must necessarily be modified to best meet the requirements of the existing condition. The perineal approach, which is the one frequently adopted, is sometimes futile on account of the very limited incision through which the surgeon is compelled to explore the deeper perineal structures, in an attempt to find the rectum, which might terminate high up in the pelvis. In such an event, an enterostomy is resorted to.

The antiquity of the operation as given by Thom[9] dates from eighteen hundred years ago; the first recorded instance being that of Egineta. Bell of England, in 1787, was the first to adopt the rational procedure of dissecting through the perineum and searching for the rectal ampulla. The first successful operation by this method in the United States was performed by Campbell, 1790. While to Amusat of Paris in 1835, and somewhat later to Verneuil, belongs the honor of perfecting the operation as it is now performed; *i.e.*, dissecting through the perineum without injury to the sphincter muscles, searching for the rectum, opening it, and suturing the bowel to the perineal incision.

SUMMARY.

Atresia and imperforate anus may be regarded as rare forms of congenital malformation of the intestine due to embryonic arrest in development. The defect occurs once in about 15,000 infants, and may be found in any portion of the intestine from the duodenum to the rectum.

It is uncertain whether the malformation is in any way influenced by hereditary tendencies, since it is impossible to arrive at definite conclusions from so few cases as these. Only one of this collection, No. 16, gave a history of another child in the family having passed feces per urethra. The prognosis is grave on account of complications, particularly in males, in which sex the malformation is more frequently present. Of these 27 cases 13 were males, 6 were females, and in the remaining 8 the sex was not given. The only treatment is surgical.

Ordinarily, the presence of a patent external anus furnishes enough proof that the intestine is well formed; but from the foregoing observations it is obvious that one cannot emphasize too strongly the importance that should be attached to the first bowel movement in the new-born, since a break in the continuity of the gut is sometimes present.

It is of further interest to note that in the following cases no operation was performed.

No. 16—Atresia, died on the 6th day.
No. 18—Atresia, died on the 5th day.
No. 22—Atresia, died on the 6th day.
No. 24—Imperforate Anus, died on the 14th day.
No. 26—Imperforate Anus, died on the 9th day.

The fact that these five cases lived over a period of from five to fourteen days without operation, makes it more apparent that early operation in every instance should be resorted to as a means to a more favorable prognosis.

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TREATMENT OF DIABETIC GANGRENE.

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GANGRENE occurring in the elderly diabetic patient has long been regarded with discouragement by both surgeon and physician. The tedious, if not eventually unsatisfactory, course

of conservative treatment, and the frequency of coma following amputation have rendered it one of the most serious of the complications of diabetes. The following seven consecutive cases illustrate successful surgical treatment, the importance of the diet in preventing postoperative acidosis, and suggest possible prophylactic measures.

CASE HISTORIES.

CASE 1. Joslin 1932, Hebrew, roofer, aged 61 years, admitted September 21, 1920. Onset of diabetes in 1906. Three months previously he noticed pain, redness and swelling of the left great toe. During the last three weeks ulceration with purulent discharge had been accompanied by increasing pain. Inflammation and oedema involved the entire toe, tarsal-metatarsal joint, and dorsum of the foot. On the plantar aspect an ulcer with a deep sinus apparently communicated with the joint. Pulsation was felt in the dorsalis pedis, posterior tibial and popliteal arteries, but the radial and brachial arteries and retinal vessels gave evidence of advanced arteriosclerosis. The urine contained a slight trace of albumin, sugar 1.9 per cent., acetone + +, and no diacetic acid. X-ray showed marked calcification of the dorsalis pedis and posterior tibial arteries.

Owing to the patient's objections immediate operation was not urged. Active motion, massage and heat were applied locally and the patient kept in bed. After three days the left great toe became black, with a sharp line of demarkation somewhat above the tarsal-metatarsal joint.

On September 28, under spinal anesthesia, Dr. R. C. Cochrane amputated the left leg at the junction of the upper and middle thirds. Recovery was uneventful and the patient was discharged on the forty-third day.

CASE 2. Joslin 1993, English auditor, aged 62 years. First seen November 19, 1920. Diabetes was discovered in an insurance examination in 1917. He had followed no special diet, as he "thought it might work out all right." One month before, his fourth toe on the left was pinched by a tight shoe. One week later, his physician found an infected corn with gangrenous borders extending anteriorly to the nail. Two weeks later, two terminal phalanges were removed under cocaine. The next joint was then involved, and within a few days the third toe became discolored. When he was admitted to the hospital on November 23, a deep, sloughing ulcer with gangrenous edges extended backward between the third and fourth toes, with oedema and redness as far as the ankle joint. Pulsation in the dorsalis pedis was barely palpable. Temperature was 100 degrees. Urine—Albumin, slight trace; sp. gr., 1026; sugar, 2.4 per cent.; diacetic acid, + +. Numerous hyaline and granular casts. Blood sugar 0.35 per cent., before breakfast. All blood sugar estimations recorded in this paper were made on fasting specimens.

On November 24, under spinal anesthesia, Dr. R. C. Cochrane amputated the leg at the juncture of the upper and middle thirds. Following operation the temperature fell to normal and remained so. No diacetic acid was present at any time after the operation. Recovery was uneventful and the patient was discharged on the thirty-seventh day.

CASE 3. Joslin 2173, an American housewife, aged 66 years. Admitted April 17, 1921. Diabetes was discovered in 1918 when she had a cerebral hemorrhage. Three months previously she burned her foot on a hot soap stone in bed, and poulticed it with linseed meal. Thirteen days before she had experienced increasing pain. During the preceding three days, at another hospital, her temperature had remained about 100 degrees, and she had received three grains of codein for her pain. On the plantar surface of the left foot was a large, deep ulcer with gangrenous borders. Oedema, redness and heat extended over the entire plantar surface and onto the dorsum as far as the ankle. Advanced arteriosclerosis of the peripheral vessels, with marked retinitis and optic neuritis, was present. Urine—Sp. gr., 1026; albumin, large trace; sugar, 0.9 per cent.; diacetic acid, 0; sediment, many pus cells. Blood sugar, 0.36 per cent.

On the day of admission, under gas anesthesia, a preliminary incision showed that the entire subcutaneous tissue on the plantar surface was necrotic; the plantar fascia was gray and sloughing at several points. On April 18, under spinal anesthesia, Dr. R. C. Cochrane amputated the leg at the juncture of the upper and middle thirds. The wound healed by first intention, and she was discharged on the thirty-third day. On January 15, 1922, she returned with a pressure sore on the knee. Blood sugar was 0.09 per cent., and her urine was sugar free. She was discharged after three days' stay.

CASE 4. Joslin 2339, Hebrew merchant, aged 70 years; duration of diabetes, eight years. First admitted on September 8, 1921, because of severe pain in his left foot. At that time the left great toe was cold and blue, and on its medial surface was a purulent bleb. Pulsation was felt in the posterior tibial, but not in the dorsalis pedis artery. Urine contained 2.5 per cent. sugar, albumin a slight trace, and a moderate number of leucocytes. Blood sugar was 0.25 per cent. Blood urea nitrogen was 27.6 mgm. per 100 c.c. The bleb was opened. While in bed, with massage and active hyperaemia, the toe became warm and normal in color, and the pains improved. The urine showed only a trace of sugar at discharge two and a half weeks later.

He reëntered October 26, complaining of severe pains in the leg. On the dorsal surfaces of the great toe and the third toe were ulcerated areas with gangrenous borders. The foot was cold and discolored. Urine contained 0.4 per cent. sugar and his blood sugar was 0.23 per cent. On the day following, under spinal anesthesia, Dr. D. F. Jones amputated the leg at the mid-thigh. Recovery was uneventful, and he was discharged on the thirty-third day.

CASE 5. Joslin 2311, an English salesman, aged 58 years, admitted August 15, 1921. Onset of diabetes August, 1913. Since that time sugar and albumin had been present in his urine whenever examined. Six weeks previously the third toe of his left foot became discolored and cold. Ten days ago the skin broke between the second and third toes. A deep ulcer with gangrenous borders extended back along the tendons. The peripheral vessels showed marked arteriosclerosis. Blood pressure was 220/120. Urine—Sp. gr., 1007; albumin, large trace; sugar, 0.2 per cent.; diacetic acid, 0; sediment, 15 to 20 hyaline and granular casts per high-power field. Numerous W. B. C. Blood sugar, 0.26 per cent. Non-protein nitrogen, 45; phenolphthalein, 19 per cent.

During the first week he remained in bed and the foot was dressed daily with sterile salt dressings. The urine became sugar free and the blood sugar fell to 0.13 per cent. He continued to have severe pain in the foot and leg, which interfered with his sleep. At the end of this time the ulcer had in no way improved and the second toe had become cold and cyanotic. X-ray showed marked calcification of the dorsalis pedis and posterior tibial arteries. As it was evident that, in spite of the improvement in his general condition, the condition of his foot was decidedly worse, operation was advised. An attempt at spinal anesthesia failed because of marked hypertrophic arthritis of the spine. No muscular relaxation could be secured under gas and oxygen, and finally etherization was resorted to with many misgivings. Dr. R. C. Cochrane amputated the leg at the mid-thigh. Following operation acetone appeared in the urine during the first few days only. Blood pressure was 170/90 the day following operation, 160/110 on the seventh day, and 145/85 at discharge five weeks later.

CASE 6. Joslin 2237, an American lawyer, aged 62 years. Diabetes was discovered in June, 1920. On April 1, 1921, he pricked a blister resulting from a slight burn on his right foot. The foot became infected and a cellulitis developed which extended above the ankle. The foot was thrice incised in June and July, but did not heal. X-ray showed osteomyelitis of the head of the fifth metatarsal and the proximal end of the first phalanx, and calcification of the dorsalis pedis artery. On August 25, Dr. R. C. Cochrane amputated the leg at the juncture of the upper and middle thirds, under spinal anesthesia. Recovery was uneventful and he was discharged on the seventeenth day. On December 1, 1921, his blood sugar was 0.11 per cent. and the urine was sugar free.

CASE 7. Joslin 2382, a Hebrew, male, aged 64 years. Diabetes was discovered in 1913. He was admitted October 14, 1921. During the preceding two weeks his right foot had been cold and painful. The peripheral vessels were markedly sclerosed, and no pulsation could be felt in the dorsalis pedis or posterior tibial arteries on the right. The right great toe was cold, blue and tender. X-ray—Marked calcification of the dorsalis pedis and posterior tibial arteries. Urine—Sugar, 6.5 per cent; diacetic acid, 0.

He remained in bed for seventeen days, the foot being kept warm and dry. Massage of the leg and active exercises at the ankle-joint were carried out. The blood sugar fell to 0.12 per cent., 0.13 per cent., and 0.14 per cent. on three different occasions, while the urine contained 0.1 per cent. or 0.2 per cent. sugar. At the end of this time, on the great toe and the second toe, two definitely gangrenous areas had appeared, and the entire foot, up to a point midway between the tarsal-metatarsal junction and the ankle, was cyanotic and cold. Under spinal anesthesia, Dr. D. F. Jones amputated the leg at the mid-thigh. At operation the femoral artery was found to be plugged almost to the mid-thigh with an organizing clot. At no time after operation did the patient show any acidosis. He became sugar free after ten days and was discharged in four weeks.

Etiology.—In these seven cases the average age was 63 years, and the average duration of diabetes, before the onset of gangrene, was six years and five months. Three of the seven patients were Hebrews, two were English and two American. All had been overweight prior to the onset of diabetes, and with one exception their occupations in earlier years had required little muscular activity. These facts may bear some relation to the extreme degree of arteriosclerosis, which was the most important immediate etiological factor. The diabetes was originally mild, or, at most, moderate in degree, as evidenced by its long duration and fairly ready susceptibility to treatment. Yet in the first three cases the fasting blood sugar was 0.30 per cent. or more, indicating the danger of neglecting treatment even in mild diabetes. Trauma had occurred in four cases, and in every instance neglect or unwillingness to accept advice delayed either prompt or radical treatment. In only three instances did the gangrenous process begin without any known or obvious trauma. The importance of painstaking surgical care for minor traumatic lesions of the feet, such as blisters, abrasions, corns, ingrown nails

and slight burns, cannot be overemphasized in relation to the prevention of gangrene.

Anesthesia.—The choice of anesthetic was considered of prime importance. Six patients had spinal anesthesia with novocaine. In no instance was any deleterious effect noted, and in contrast with ether practically no acidosis occurred after operation. In one patient marked hypertrophic arthritis of the spine made spinal anesthesia impossible. This patient, No. 5, a powerful man, did not relax under gas and oxygen, and therefore was given ether, in spite of hypertension and chronic nephritis.

Diet.—Once the patients were in the hospital decision as to operation rested with the surgeon. In two cases operation was performed within twenty-four hours of admission. During this time fat was omitted from the diet and carbohydrate in the form of orange juice and oatmeal gruel was given. In the other cases, where the preoperative period varied from one to three weeks, moderately restricted diets, with a preponderance of carbohydrate, were employed. No patient was fasted.

The following table summarizes the diets given previous to operation, during the three weeks following operation, and the diet at discharge:

TABLE I
AVERAGE DAILY DIETS

Case	Preoperative Time in Hospital	Preoperative C	Preoperative P	Preoperative F	Postoperative 1st Week C	1st Week P	1st Week F	2nd Week C	2nd Week P	2nd Week F	3rd Week C	3rd Week P	3rd Week F	At Discharge C	At Discharge P	At Discharge F
I	7 Days	78	52	10	58	44	24	50	58	36	59	62	47	75	71	54
II	1 Meal	20	23	0	77	43	20	58	40	33	63	51	44	96	67	54
III	Immediate operation				114	51	10	69	42	34	68	47	35	114	59	65
IV	1 Day	32	34	45	38	23	34	33	35	48	30	33	57	45	41	70
V	8 Days	41	25	24	75	33	33	58	43	69	69	54	82	86	64	86
VI	No food before operation				71	45	43	70	65	80				60	68	72
VII	17 Days	51	42	46	32	44	33	35	44	50	41	50	73	65	55	75

NOTE: C=carbohydrate, P=protein, F=fat.

Only one patient entered the hospital sugar free, and he had been under observation for some time at his home. No operation was postponed in order to get the patient sugar free, and indeed five operations were performed in the presence of both glycosuria and hyperglycemia. Yet every patient left the hospital sugar free. The following table gives the blood sugar values during the preoperative period, three weeks postoperative, and at discharge:

TABLE II
BLOOD SUGAR PERCENTAGES
(Before Breakfast)

	Preoperative	Postoperative 1st Week	2nd Week	3rd Week	At Discharge
I	0.30—0.29	0.37—0.30	0.25	0.24	0.15
II	0.35	0.32	0.22	0.19	0.16
III	0.36	0.36		0.20	0.15
IV	0.23		0.20	0.17	0.11
V	0.26—0.13	0.24	0.16	0.13	0.13
VI	—	0.17	0.19	0.10	0.10
VII	0.12—0.14	0.15	0.13	0.11	0.14

NOTE: Analyses were made by the Folin-Wu method.

Discussion.—That the course of gangrene with infection occurring in diabetics differs from that of non-diabetic patients has long been recognized. Lambert and Foster have reported cases illustrating the extraordinary improvement in the local condition with dietetic treatment which removed acidosis and glycosuria. They state that many cases of so-called "diabetic gangrene" are really no more than acute infections whose course is modified by the presence of diabetes. In such cases they found that diabetic treatment, together with drainage of pus pockets, removal of sloughs, and formalin dressings, resulted in normal granulation and ultimate recovery without amputation. Stettin, himself a surgeon, also advocates conservative treatment.

However, in another group, best illustrated by five of these patients, the process must be regarded, at least from the therapeutic standpoint, as arteriosclerosis plus infection complicated by diabetes. When extreme arteriosclerosis, with partial or complete occlusion of the arteries supplying the part, exists, the local process must advance in spite of improvement in the diabetes. In four of the cases cited conservative treatment,—*i.e.*, rest in bed, diet to reduce hyperglycemia and glycosuria, elevation of the foot, massage, active and passive hyperaemia—was tried for periods varying from one week to four months. In each instance, in spite of the patient's becoming sugar free and having normal blood sugar, pain continued and the gangrenous process advanced. Granting that diabetes may have an etiologic relationship to the arteriosclerosis in the first place, diabetic treatment will not repair the arterial damage at such a late stage. Roentgenograms are most valuable in giving evidence of calcification of the arteries, osteomyelitis or joint destruction. Calcification of arteries strongly suggests the uselessness of delaying amputation, especially if bone and tendon destruction have also occurred. With such patients delay is dangerous.

In the presence of advanced peripheral arteriosclerosis, lowered renal and circulatory function may be expected. Of the patients here reported three excreted from 12 to 40 per cent. phenolphthalein in two hours ten minutes; four had hypertension ranging from 160 to 220 mm. mercury; three had definitely enlarged hearts; seven had albuminuria; four had albumin plus casts in the urine; and four had non-protein nitrogen values in excess of 40 milligrams per 100 c.c. of urine. Not only acidosis but circulatory failure or renal complications were to be considered.

Spinal anesthesia in no instance was accompanied by evidence of shock or increase of acidosis. The patients were given from 2000 to 3000 c.c. of fluid daily, including cocoa shells, broth, weak tea and coffee. The salt in the diet was limited to five grams daily, and often was less, as indicated by the salt in the urine, which varied from two to six grams daily during three weeks after operation. The protein in the diets varied from seven-tenths of a gram to one gram per kilogram body weight. Most important in the prevention of acidosis was an excess of carbohydrate over fat, and the avoidance of such radical changes in the diet as fasting in the effort to render the urine sugar free. Elderly patients do not bear fasting well under favorable circumstances and at the time of operation fasting is fraught with grave danger.

SUMMARY.

1. Seven cases of diabetic gangrene with successful operative treatment are reported

2. The prevention of gangrene of the feet in diabetes depends upon

(a) Conservation of the circulation by special exercises, massage, and rest.

(b) Avoidance of such practices as cutting corns, pricking blisters, cutting toe nails too closely.

(c) Careful aseptic surgical treatment of minor lesions, such as blisters, corns, burns, etc.

3. The first step in the treatment of infections is to secure circulatory support by elevation of the foot.

4. If gangrene and infection are established, amputation is indicated so soon as non-operative surgical treatment ceases to give definite improvement.

5. Decision as to operation should always rest with the surgeon. Operation is possible and practicable even in the presence of sugar, acidosis or both.

6. Patients, especially if fat or aged, should not have fasting treatment in preparation for operation.

7. During 48 hours before and after operation the diet should consist of a moderate supply, or for a diabetic a liberal supply of carbohydrate food amounting to 50 or 100 grams daily in the form of such easily digested articles as orange juice, oatmeal gruel with skimmed milk, shredded wheat, Uneeda biscuit and egg albumin.

8. Spinal anesthesia is the first choice, gas and oxygen the second, and ether should be used only as a last resort, and then for the briefest space of time.

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HYDATID CYST OF THE LUNG.

REPORT OF TWO CASES.

BY GERARDO M. BALBONI, M.D., BOSTON.

During the last five years in the Out Patient Department of the Massachusetts General Hospital, one or more cases of hydatid disease have been observed yearly. Up to 1917 twenty-nine cases were studied and reported.[1]

In sixteen cases the cysts were located in the liver alone; in five cases other parts as well as the liver were involved, namely, the peritoneal cavity twice; omentum, lung, and kidney once each; in the other eight cases the cysts were found in the brain, heart and pericardium once; kidney twice, peritoneum once, gastro-hepatic omentum once and retroperitoneum twice. There were no cases of hydatid cysts primarily of the lung. Since then two cases of the lung have been observed; one a unilateral cyst of the right lung, the other multiple cysts of both lungs.

These two patients came to the Out Patient Department principally for cough and bloody sputum.

One of these cases is of considerable interest on account of having multiple echinococcus cysts of both lungs with a probable cyst of the kidney. A similar case has recently been reported.[7]

Cranwell and Vegas in their reported statistics mention two cases of double cysts of one lung; one had two cysts of the right lung, the other had two cysts of the left lung, found at autopsy. Recently Alfredo Buzzi[6] reported a sixteen-year-old boy with two cysts of the right lung. He also mentions a case of Araz Alfaro[6] with multiple cysts of the right lung and a cyst of the left lung revealed by the x-ray and confirmed at autopsy.

It has always been thought by observers of the disease that the liver is the chief seat of the disease. Of late years many more cases of echinococcus cyst of the lung have come to light, due to the more extensive use of the x-ray in the study of chest conditions. As a rule the disease is one-sided and runs a chronic course.

The right lung is more often affected than the left. The most frequent seat of the disease is the middle portion of the lung from the fourth

to the eighth rib, with a tendency to occur lower down. The highest location in the lung has been the axillary region, no case having been reported at the apex. The most common seat is at the periphery of the lung, and cases have been reported adherent to the pleura. If the cyst is located at the periphery of the lung the physical signs are more important than if centrally located. The increase in the size of the hydatid cyst of the lung is not subject to any rule, and the elastic pulmonary tissue accommodates itself to the morbid condition without any reaction for months, and sometimes years.

Hydatid of the lung occurs in two forms: the closed and the open cyst. The open cyst is that which has ruptured into a bronchus or into the lung structure. The expulsion of part or the whole of the contents of the cyst may take place; infection of the cavity occurs, expulsion of purulent material results, sometimes with hemorrhage and severe shock from the absorption of cyst contents. If exit is blocked there result the symptoms of absorption of septic material. Membrane, vesicles and scoleses have been found in the expectorated material of a ruptured cyst. The contents of the cyst may be clear fluid or purulent material. Taubenschlag[2] has seen as many with clear fluid as purulent. When the cyst ruptures into a bronchus the membrane may undergo degenerative changes from infection of the cavity. Spontaneous cure of the cyst is very rare. This may come about by the death of the hydatid or from rupture of a cyst into a bronchus with the expulsion of the fluid and membrane, subsequent calcification and cicatrization of the cavity. Navarro[3] has reported a case of spontaneous cure of hydatid of the lung in a child five years of age.

Briefly stated the symptoms may simulate any pulmonary infection. The symptoms vary; not until the cyst ruptures or the lung becomes inflamed or congested will the patient be conscious of any trouble. Trauma may be the predisposing factor, as in Case 2. Cough, pleuritic pains, expectoration of bloody or clear sputum, not uncommonly a frank haemoptysis. Bloody sputum is a frequent occurrence[4]. Dyspnoea is an inconstant sign. There may be loss of weight and strength, rarely fever unless the cyst has ruptured and become secondarily infected.

Eosinophilia has rarely been present in any of the cases studied, and when present is of negligible value. The complement-fixation test is confirmatory[1], but when negative does not rule out the disease, as a dead cyst will give a negative reaction as in one of the present cases. Then again the test is not always available. The x-ray is our chief aid in the diagnosis, especially in the closed cyst. Exploratory puncture of the cyst is inadvisable, as sudden death may occur from the rupture of the cyst or from a severe haemoptysis[5]. The cyst fluid has been evacuated and 1-1000 bichloride solution injected with negligible result.

The x-ray findings may be divided into three distinct pictures: 1st—Closed cysts, which occur as dense circular or oblong, sharply defined areas of increased density within the lung field. The dull area is of even density throughout and the surrounding lung tissue is normal in appearance. The respiratory movements of the diaphragm are only slightly affected and the mediastinum is not involved. 2nd—Open cysts, which may be sub-divided into those which have ruptured into a bronchus and those which have ruptured into the surrounding lung. In the former, the appearance is the same as in closed cysts, excepting that the involved area is of diminished instead of increased density, the appearance suggesting a large cavity with sharply defined borders.

When rupture occurs into the lung structure the appearance closely resembles that of lung abscess. The borders of the lesion are no longer sharply defined and the pleura may be involved, producing a marked limitation of the respiratory excursion of the diaphragm on the affected side.

CASE 1. A. A. 22. Single, Greek. Farm hand. In the U. S. five years; admitted to O. P. D. February 17, 1917.

Chief complaint. Cough, pain in chest, and blood in the sputum.

Present illness. About one and one-half years ago, after slight exertion, he coughed up a teaspoonful of bright red blood, having had a cough six months previous to this. Again, about one year ago, coughed up a glass full of bright blood (one-half glass at a time) after very little coughing. He then stayed in bed the next three months and had bloody sputum every day in streaks and clots; no large hemorrhage. At the end of that time he began to work again and had a little bloody sputum every three or four weeks. One month ago he coughed up one tablespoonful of fresh blood, but none since. During the past one and one-half years, has had only slight cough, mostly in the morning, raising from two to three teaspoonfuls of sputum throughout the day. He felt well, was able to work without feeling tired, and had a good appetite. Has lost some weight and has had no night sweats. Three or four days ago felt tired, unable to work, and had a true chill late the next evening and felt feverish. Some pain in right front chest on coughing. No expectoration of clear fluid.

Past illness. Definite illness at sixteen years. In bed for six months; pain all over abdomen and in the back. Amputation of middle and fourth fingers of the right hand by machine three years ago. In Sparta, worked on a farm. No sheep, one dog.

Physical examination. Well developed and nourished. Mouth and teeth good. No glandular enlargement. *Chest* well developed, expansion equal. *Lungs.* Dullness at right base, posterior

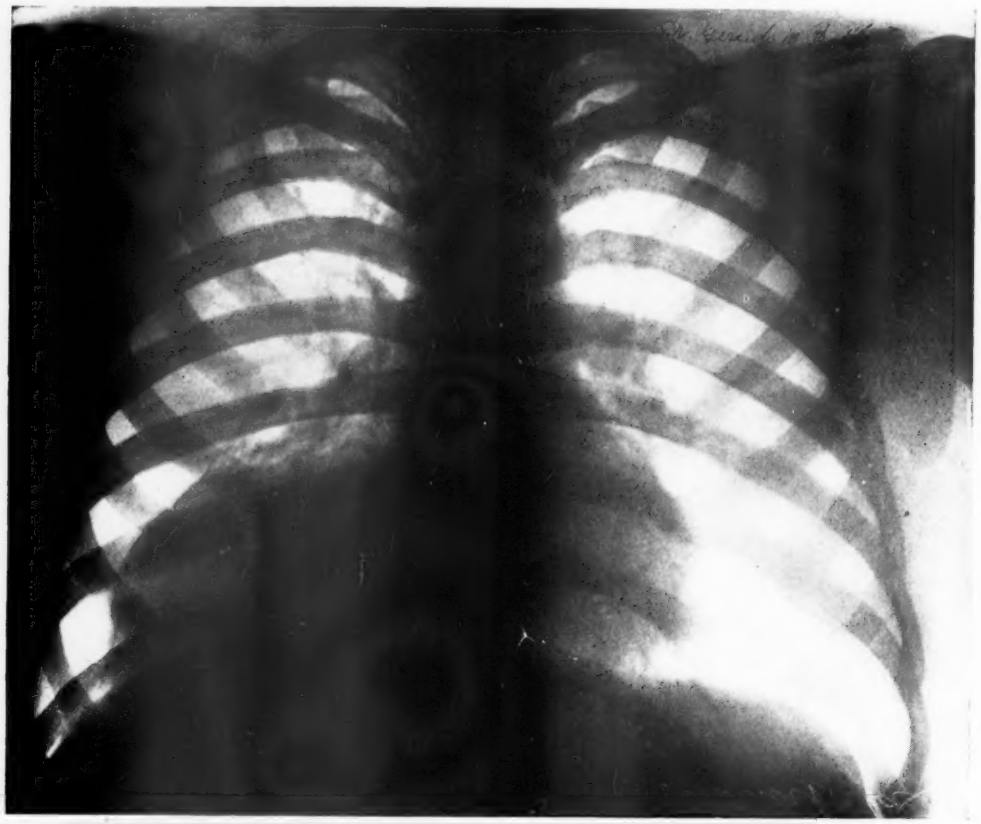

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PLATE 1.—X-ray of chest in CASE 1, showing cyst of base of right lung as a dense mass, the shadow of which blends with the shadow of the diaphragm.

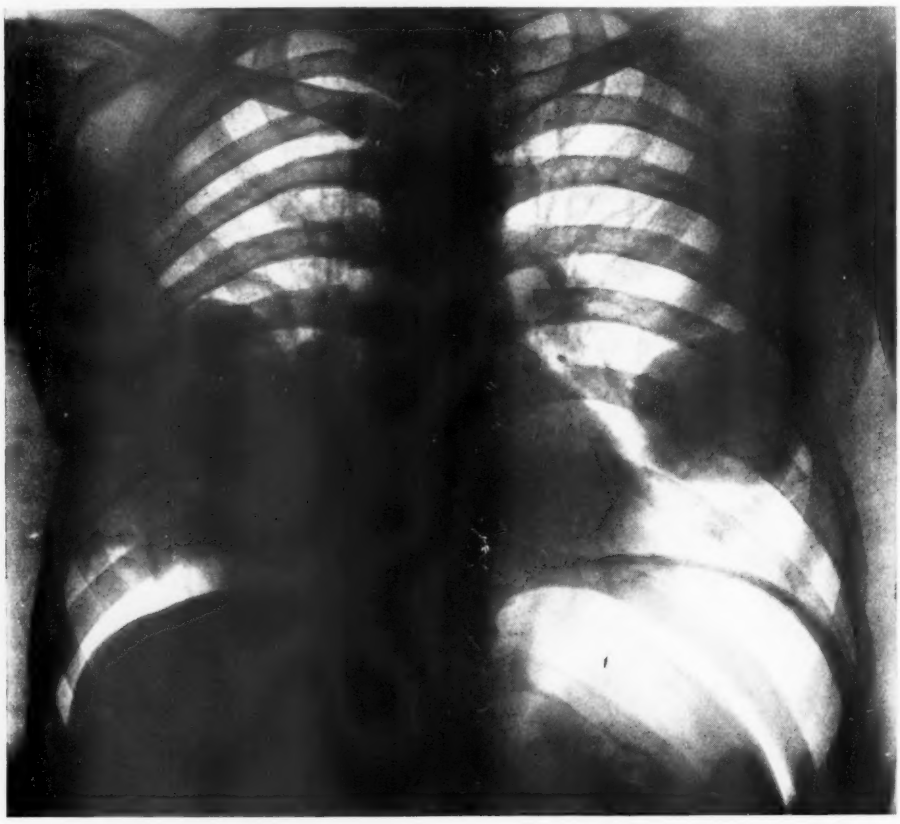

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PLATE 2.—X-ray of chest in CASE 2, showing in the right lung three types of cysts. The dense round shadow is that of a closed cyst; the superimposed ring is the outline of a cyst which has emptied into a bronchus; mesial to these is an irregular shadow due to the rupture of a cyst into the surrounding lung tissue. There is a closed cyst also in the left lung.

and anterior, with diminished breath sounds and whispered breath, absent tactile fremitus from angle of scapula downward. *Heart.* Negative. *Abdomen.* Slight tenderness over liver, which is palpable, otherwise negative. *Spleen,* not felt. *Reflexes,* normal. *Sputum,* negative; blood smear, normal; Wassermann, negative; echinococcus fixation, negative; urine, negative.

X-ray examination by Dr. G. W. Holmes. The definite outline of a round, dull mass can be seen at the right base, apparently somewhat nearer the front than the back of the chest; it is about the size of a grape fruit and its lower border is lost below the dome of the diaphragm. It does not move with ordinary respiration, but can be displaced somewhat with forced respiration. It is of an even density throughout and its borders are sharply defined. The heart is not displaced.

Operation, Dr. W. Whittemore. Thoracotomy with excision of rib for cyst of the lung. One-fourth of seventh and eighth ribs excised below angle of scapula. Intercostal muscles tied and removed. Pleura opened. It was somewhat thick. Many thin adhesions found between pleura and firm mass in right lower lobe. Diaphragm somewhat below this. Mass sutured to parietal pleura. Incision made in mass, one inch deep, which seemed to go through lung tissue. Needle inserted one inch further. Small amount of clear fluid found. Patient began to pass clear fluid through nose and mouth. Finger dissection into mass opened up a large cyst filled with clear fluid. About 1,500 cc. clear fluid evacuated. No small cysts or hooklets found. Cigarette drain to cavity. Considerable drainage of clear fluid.

Pathological report. A small fragment from the wall of the cyst, showing on microscopic examination a bit of lung whose alveoli are compressed with fibrosis and small round cell infiltration of the connective tissue. There are numerous areas of hemorrhage and some of the alveoli are filled with large cells choked with brownish pigment. There is no evidence of echinococcus. Chronic inflammation.

December 11, 1917. Report from cyst fluid.

Specific gravity, 1.012. Protein, 1.05%. Sugar, 0.055%. Chlorides, .74%.

Creatinine, 0.56 milligrams per 100 c.c. fluid. Urea nitrogen 15 milligrams per 100 c.c. fluid.

Discharged relieved to O. P. D.

January 1. Very slight discharge. Still pain in right costal margin.

January 6. Patient well, wound clean and solid, discharged.

Re-enters hospital September 19, 1919.

Present illness. Since leaving the hospital the patient has continued to cough, especially in the early morning and at night. Still raises small amount of blood, some times bright, but usually dark. No big hemorrhage. Dull localized pain in right lower chest since operation. The pain is increased by coughing. The patient has been working on a farm up to ten months ago, when the pain became too severe to continue work. He has had no other illness since operation and has not lost weight, but feels weak.

Physical examination. Thorax. Some limitation of motion of the right base. *Lungs.* Dullness from seventh rib, right back, extending forward to front at fifth rib. Absent tactile fremitus. Diminished to absent whispered voice and vocal fremitus, also breath sounds diminished. No râles. Slight area above this with increase of tactile fremitus, vocal fremitus and breath sounds. No râles. On the left, dullness in the base from the ninth rib. *Heart,* normal.

Operation by Dr. Whittemore, September 24, 1919. Thoracotomy for recurring echinococcus cyst. Gas oxygen anaesthesia. Incision about 10 cm. long made in scar of old thoracotomy wound and rib resected for about 6 inches. Lung found to be adherent to costal pleura. A large tumor mass presented in lung. On opening into this it proved to be a large cyst and a considerable amount of clear fluid was evacuated. Several large fragments of cyst wall were removed, the cavity was packed with gauze and the wound partially closed.

During the first few days after operation there was considerable drainage of a clear fluid. On the fourth day the packing was removed and the following day the remainder of the cyst was expelled through the operative wound. The wound healed very promptly following this, and in three weeks it was entirely healed. The patient had an uneventful convalescence.

Pathological report. Irregular pieces of cyst wall which show smooth, pearly white surface and which have an elastic consistence. No hooklets can be found on fresh examination. Microscopic examination shows a laminated membrane without cellular structure. The gross or histological appearances are in every way consistent with echinococcus cyst.

CASE 2. P. P. Age 25, white, Greek, single. Laborer in cotton mill; in the U. S. five years; admitted to O. P. D. Sept. 24, 1919.

Chief complaint. Pain *in the chest* and cough with blood in the sputum.

Present illness. About two years ago was hit on the right side by a piece of iron which fell on him. He was taken to a hospital at Youngstown, Ohio, where he stayed four months and was two months in bed. He was treated medically. At this time he began to cough a lot, often raising bloody sputum. He felt fairly well after leaving the hospital and the cough left him. About six months later cough and hemoptysis returned with pain in the right chest. For the last seven months has not been able to work because he felt sick, raised blood off and on, had pain in the right side and coughed much. Sometimes he has had pain in the left side also. Appetite, poor. Bowels, regular.

Past history. Always well up to present illness; was shepherd in Greece, with dogs associated with him. Weight at present, 150 pounds; two years ago, 170 to 175 pounds.

Physical examination. Well developed and nourished. Skin clear, cheeks flushed, head negative; sclerae clear, pupils equal, regular; tongue coated, throat and tonsils negative; neck negative; chest, well developed; expansion left side greater than right; heart normal in size and position, sounds regular, good quality, no murmurs; lungs, *right chest* dull below spine of scapula almost to flatness, with râles and bronchial breathing, dull in axilla. *Left chest,* râles in lower one-half, with some bronchial respiration; spine negative, no costo-vertebral tenderness; abdomen soft and tympanitic, no masses, spasm or tenderness. Genitals negative, no hernia. Extremities, negative. Reflexes, normal. Blood, white blood corpuscles 7800; red blood corpuscles 7,296,000; 6,896,000; Hgb. 100%; stained specimen, reds normal, platelets normal, but increased. *Poly.* 78; *eosin.* 5; *mast* ½; *lym.* 5½; *L.M.* 11; Stools, normal; no *parasite* or *ova.* Wassermann negative. Echinococcus fixation test strongly positive.

Sputum. Specimen is mucopurulent and shows no evidence of hooklets or membrane. It is negative for T. B. and shows no characteristic bacteriological finding. Urine amber, clear, acid 1028, albumen 0, sediment 0.

X-ray by Dr. George W. Holmes. In the left chest, below the fifth rib, there is an area of increased density, 4 cm. in diameter; it is round and of even density, with sharply defined borders.

When the position of the tube is changed, overlying it there is a ring-like shadow of diminished density which changes its relation, suggesting a different plane to the dense shadow. Neither reaches the periphery. Similar slightly larger process is seen in the right lung below the fourth rib, with involvement of lung structure.

February 16, 1920. X-ray. Oxygen inflation of abdomen. Appearance in chest much the same as in previous notes.

It is possible to see distinctly the outline of the liver and spleen. They appear to be normal in size and shape; just below the lower margin of the liver there is a round, dense mass, which is apparently connected by a band of adhesions to the abdominal wall.

There is a ring-like shadow in the left kidney, having all the appearances of an echinococcus cyst.

Under the direction of Dr. George W. Holmes, from October 3, 1919, to May 15, 1920, the patient received nine x-ray treatments from two to four weeks intervals, with no improvement in the symptoms, or change in the x-ray findings, nor was there any alteration in the fixation test taken on three different occasions.

When the patient was last seen in May he still complained of an irritative cough, occasionally blood-streaked sputum, pains on both sides of the chest and left kidney region. Tried to work part of the day, but tired easily.

REMARKS.

Echinococcus cyst of the lung is one of the conditions to be thought of and ruled out in cases of pulmonary disease with bloody sputum or frank haemoptysis, especially among the immigrant classes from continental Europe and Asia Minor. The disease is common in South America, Australia, and New Zealand.

The x-ray is our chief aid in the diagnosis, especially in the closed cyst of the lung, and the complemental fixation test when positive is confirmatory, but not essential. Of course the finding of hooklets in the sputum will make the diagnosis, but the cyst will then have ruptured into a bronchus.

TREATMENT.

There is no medical treatment. X-ray treatments may be tried. It had no effect in Case 2. Salvarsan has been tried[1], with no apparent result.

Whenever possible, surgery is the treatment.

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STUDIES IN PANCREATIC FUNCTION. ENZYME CONCENTRATION OF DUODENAL CONTENTS AFTER THE INGESTION OF PURE FOODSTUFFS AND FOOD MIXTURES BY NORMAL MEN.

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THE present communication is a report of the results derived from a study of enzymatic activities of duodenal contents. The duodenal contents were obtained from normal young men after feeding pure carbohydrate, protein or fat, both alone and in various combinations, and also after the ingestion of certain food mixtures to be described later. The purpose of the study was to compare the effect of the various types of foodstuffs on the relative amounts (concentrations) of enzymes present in duodenal contents, as ascertained by estimation of the degrees of enzyme action; and by the

same method an attempt was made to determine the relative amounts (concentrations) of enzymes developed at various periods during the time the stomach was emptying itself of food.

Important studies on the rôle of the pancreas in intestinal digestion begin with the work of Claude Bernard[1] in 1856. This observer presented detailed evidence of his claim that the pancreatic juice was of great importance in the process of digestion. But the truth of Bernard's contention was not appreciated for many years, and the physiologists of his time, unable to confirm his observations, opposed the view that the pancreatic secretion played an important rôle in digestion.[2] The rôle of the pancreas in digestion remained unsettled until the studies of Pawlow,[3] Pratt, Lamson, and Marks,[4] and McClure and Pratt[5]; although much important work on the digestive function of the pancreas was reported by other observers between the years 1890 and 1911.[5] Pratt, Lamson, and Marks[4] found that excluding pancreatic secretion from the gut of dogs was immediately followed by the lack of absorption of gross amounts of fat ingested by the animal, and that this failure of absorption remained constant. These observers were able to demonstrate that technical errors accounted for contradictory results obtained by various workers. McClure and Pratt[5] confirmed the observations of Pratt, Lamson, and Marks, and also demonstrated that depancreatized dogs absorbed from 10 to 50 per cent. of nitrogen and from 17 to 50 per cent. of the fat ingested. Further, they proved that presence of pancreatic tissue in an animal's body is not necessary for the absorption of the products of intestinal digestion, as was held by Lombroso.[6]

The rôle of the pancreas in digestion as demonstrated by the classical work of Pawlow is admirably presented in the well-known book entitled, "The Work of the Digestive Glands". Pawlow worked with dogs, in which animals he produced the fistulae which bear his name. By means of a fistula he was able to obtain pure pancreatic secretion. In this secretion, obtained after feeding meals consisting essentially of protein, fat or carbohydrate, the activities of the various types of enzymes were studied. From these studies Pawlow concluded that the kind of food eaten called forth an increase in the secretion of the enzyme specific for that particular type of food; *i.e.*, protein food caused the secretion of a predominant amount of trypsin, carbohydrate food of amylase, etc.

In 1902, Bayliss and Starling[7] believed they proved the presence in the intestinal mucosa of a substance called "prosecretin". This "prosecretin" is thought to be converted into "secretin" by the action of hydrochloric acid coming from the stomach. The "secretin" thus formed is believed to be carried through the blood stream to the pancreas, and after reaching that organ to excite its external secretion. But as is pointed out by von Fürth[8], various substances, such as cholin, are present in the duodenal mucosa, which have the same action on the pancreas as has "secretin". For this reason von Fürth concludes that until much more is found out about the chemical nature of "secretin," its actual existence remains unproved. Furthermore, nervous control of the pancreas may possibly be important in stimulating its external secretion.[9] Therefore, it is evident that the status of the factor or factors stimulating the secretion of the pancreatic juice is not well established.

All of the work discussed in the foregoing paragraphs has been carried out on lower animals. Just how much of this work is applicable to man can only be determined by actual observations on human subjects. However, there is much pathological evidence confirming the importance of the external secretion of the pancreas in digestion in man; for example, exclusion of pancreatic juice from the intestines in man is known to be accompanied by marked disturbances in the digestion and absorption of food. But much less is known about the character of pancreatic juice secreted by the human pancreas during digestion. Various investigators have attempted to repeat Pawlow's experiments on human subjects with pancreatic fistulae. These subjects have, however, with one exception, been in such pathologic states or the pancreatic secretion obtained has been so contaminated by material from the intestines that interpretation of experimental results has been problematic. Wohlgemuth[10] was fortunate enough to get pure juice from a human subject with a traumatic pancreatic fistula. Other than for the presence of the fistula, the subject was in normal physical condition. Wohlgemuth repeated the experiments on this subject which Pawlow had carried out on dogs. The results obtained are as follows: The ingestion of food consisting largely of fat brought about pancreatic secretion showing the greatest degrees of all types of enzyme action, while the secretion following a carbohydrate meal showed the least. On the other hand, carbohydrate meals were followed by the secretion of the largest amounts of pancreatic juice, while fatty food produced the least. Thus the results of Wohlgemuth's observations showed the existence of a relation between the kinds of foodstuffs ingested and the amounts of pancreatic juice secreted, and also, the degrees of enzyme action found in this juice. However, no relation was demonstrated between the type of foodstuff fed and the degree of activity of the enzyme specific for that kind of food, as was found by Pawlow in his work on dogs. In this connection it is well to emphasize that the methods for estimating the degrees of enzyme action used by Pawlow, Wohlgemuth, and others, are subject to various errors, so that interpretation of results obtained by their use are open to serious criticism; as has been discussed in a former communication.[11] Nevertheless, their results show that the secretion of pancreatic juice during

digestion is in some way governed by the food ingested.

The results of the work outlined in the foregoing discussion permit the following conclusions: 1. Ingestion of food is followed by the secretion of pancreatic juice; but the exact mechanism by which the secretion is stimulated is not established. 2. The external secretion of the pancreas plays a most important rôle in digestion.

While the work outlined above has yielded much of great importance, the methods used have not permitted the study of the conditions under which intestinal digestion actually occurs in living man. It is generelly accepted that the end-products of intestinal digestion in man are the same as those in the lower animals; that is, carbohydrates are converted into monosaccharids, fats into soaps, and proteins into amino acids, and that these end-products are absorbed as such. But it should be noted that it was not until the comparatively recent work of Folin,[12] and of Van Slyke[13] that the absorption from the gut of the end-products of protein digestion was established.

There are available but few studies on the physical and chemical conditions under which intestinal digestion occurs in man. In fact, many of the conditions affecting enzyme action were not established until the publication of the work of Sörenson[14] as late as 1909. This investigator showed that enzyme action was dependent on the hydrogen ion and buffer conditions, as well as those of temperature, under which the enzyme was placed. Practically the only studies on the physical chemistry of intestinal digestion in the living, normal, human subject are those of McClendon *et al.*,[15] and the studies of McClure, Wetmore and Reynolds.[16] Hydrogen ion concentration determinations published by these investigators show that after the ingestion of a mixed diet the pH of duodenal contents of normal man varies in the immediate neighborhood of 4 to 7. McClure, Wetmore and Reynolds[11] have devised methods for the estimation of degrees of enzyme action of duodenal contents which conform to the present-day conception of the physical chemistry of enzyme action, and (a) have made some studies[16] on the physical character and enzymatic activities of duodenal contents obtained from normal young men. The purpose of the latter studies was to devise a procedure for obtaining duodenal contents which would permit the establishment of a normal for the various types of enzyme activities, for use in certain clinical studies. Incidentally, however, it was found that the ingestion of different types of food brought about duodenal contents showing rather characteristic degrees of viscosity, varying in color and consisting very largely of liquid containing but very small amounts of the food originally eaten.

Further studies on the details of physiology of intestinal digestion in normal man were considered important; because only by such knowledge can those processes of pathologic physiology of abnormal gastrointestinal conditions be ascertained which are of importance in clinical medicine. For this reason the present study of the duodenal contents of normal young men has been made.

PROCEDURE.

The subjects chosen for the study were normal young men who gave no history of gastrointestinal derangement. The subjects were instructed to eat a light supper the evening before an experiment, to drink only water during the evening and to ingest nothing after midnight. The following morning the Rehfuss gastroduodenal tube was passed on the empty stomach and without the aid of water. The metal tip was allowed to pass through the pyloric sphincter and as far as the second portion of the duodenum; its position being ascertained by means of fluoroscopic observation. The subjects then reclined on the right side and the duodenal contents were collected either (a) both before and after the ingestion of food or (b) only after the ingestion of food. The contents were siphoned off.

Enzymatic activities were estimated by the methods developed by McClure, Wetmore and Reynolds.[11] In these methods proteolytic activity is estimated by allowing duodenal contents to act on a solution of soluble casein. The casein not affected by the proteolytic enzyme is precipitated by means of metaphosphoric acid solution. The index of proteolytic activity is taken to be the number of milligrams of nitrogen not precipitated by the metaphosphoric acid. This nitrogen is determined by an adaptation of the method of Folin and Wu for the determination of nonprotein nitrogen in the blood. Amylolytic activity is estimated as the number of milligrams of glucose developed by the action of duodenal contents on a solution of soluble starch. The index of amylolytic activity is taken to be the total number of milligrams of glucose developed, as determined by the method of Folin and Wu for the determination of sugar in the blood. Lipolytic activity is estimated by allowing duodenal contents to act on a true emulsion of cottonseed oil and determining the amount of acidity developed by titrating with tenth normal NaOH solution. The total number of c.c. of N/10 NaOH necessary to neutralize the acidity developed is used as the index of lipolytic activity. The duodenal contents and the reagents used must be controlled for the presence of nitrogen not precipitated by metaphosphoric acid, for copper reducing bodies and for acidity.

The pure foodstuffs used were arrowroot starch, edestin,* casein and olive oil. The food mixtures were (a) 300 c.c. of a mixture of milk, water, and cottage cheese and (b) 300 c.c. of 20 per cent. cream. The food mixtures were mixed with 40 gms. barium sulphate, which allowed

* The preparation of edestin was furnished by the Arlington Chemical Company, Yonkers, N. Y., whom we thank for their coöperation.

their behavior in the stomach and duodenum to be observed through the fluoroscope.

Duodenal contents may be obtained by means of the duodenal tube, either with or without the use of aspiration. For purposes of description the collection of contents without the use of aspiration is called siphonage. By either method the flow of duodenal contents through the tube was found to be intermittent, issuing in jets at intervals varying from a few seconds to several minutes. By means of the fluoroscope it was determined that the jets occurred coincidently with the presence of peristalsis in the duodenum, while in the absence of peristalsis only a few drops or no fluid at all were obtained. These observations indicate that the flow of duodenal contents is dependent on an increase in intraduodenal pressure; and for this reason aspiration has no advantage over siphonage. In the work here reported duodenal contents were collected by siphonage.

The enzymatic activities of 20 specimens of fasting duodenal contents were studied. These specimens were collected from six subjects over periods of thirty minutes. The results obtained, together with the quantities and physical character of the duodenal contents, are outlined in the following table (Table I).

Study of the table shows that proteolytic activity varied from 1.2 to 5.0 mgms. of nonprotein nitrogen, lipolytic activity from 0.0 to 2.7 c.c. of N/10 NaOH, and amylolytic activity from 0.3 to 6.7 mgms. glucose. The quantities obtained were from 15 c.c. to 58 c.c. in 15 specimens; while in two specimens 2 c.c. and in one 135 c.c. were collected. All the specimens were of very slight viscosity, and lightly stained some shade of yellow by the presence of bile, except three. Of the three exceptions noted, two were more deeply bile-colored and moderately viscid, and one was fairly viscid and partly light yellow and partly dark yellow in color.

After the ingestion of food substances in volumes of 50 c.c., collection of duodenal contents was divided into three stages, as follows:

1. From immediately after the ingestion of the food substance up to the time the duodenal contents became markedly darker in color (due to bile); *the first stage of collection.*
2. Then over the period of the succeeding hour; *the second stage of collection.*
3. Then over the period of a second hour; *the third stage of collection.*

Study was made of duodenal contents ob-

TABLE I.

Enzymatic activities, amounts and physical character of fasting duodenal contents collected over 30-minute periods.

Subject.	Enzymatic activity.			Amt. in c.c.	Color.	Viscosity.
	Proteolytic in mgm. NPN.	Lipolytic in c.c. N/10 NaOH.	Amylolytic in mgm. glucose.			
Cush	2.1	0.0	0.3	20	Pale yellow	Slight
	3.7	0.7	3.7	20	Pale yellowish green	Slight
	2.7	1.8	2.3	20	Pale greenish yellow	Slight
Ought	2.4	2.7	1.4	50	Pale greenish yellow	Slight
	1.2	0.4	0.6	135	Light brown	Moderate
	1.8	0.5	0.3	15	Lemon yellow	Slight
	1.8	0.5	0.3	15	Lemon yellow	Slight
	4.3	1.8	0.8	60	Lemon yellow	Moderate
White	4.6	0.8	3.9	25	Greenish brown	Moderate
	3.7	1.0	0.8	2	Lemon yellow	Slight
	3.7	1.0	0.8	2	Lemon yellow	Slight
	5.0	0.8	2.4	37	Dark greenish brown	Moderate
	3.0	0.2	2.3	20	Pale yellow	Slight
	3.0	0.8	2.9	40		
	2.4	0.4	3.2	17		
	5.0	1.1	6.7	10	15 min. light yellow 15 min. dark yellow	Moderate
McQ	2.5	0.4	1.6	58	Pale yellow	Slight
	1.4	0.6	2.1	43	Pale yellowish green	Slight
Brown	3.0	1.1	0.8	39	Pale yellow	Slight
Desj	3.9	0.5	2.0	60	Deep golden yellow	Moderate

TABLE II.

Enzymatic activities, amounts and physical characters of duodenal contents obtained during the first stage of collection.

Subject	Enzymatic activity			Amt. in c.c.	Period of collection in minutes	Color	Viscosity	Presence of food	Kind of food ingested
	Proteolytic in mgm. NPN.	Lipolytic in c.c. N/10 NaOH	Amylolytic in mgm. glucose						
Ought	3.9	2.3	1.4	30	9	Pale yellowish green	slight	none	casein
	0.0	0.2	0.0	50	24	light yellow		some	
White	4.2	1.6	2.0	23	14	brownish yellow	slight	none	casein
Cush	3.5	0.2	3.1		23	yellowish			casein --
Cush	0.9	0.3	1.1	40	32	Pale yellowish green	slight	10 c.c.	olive oil
McQ	0.8	0.3	1.2	38	12	Pale yellow	slight	some	olive oil
Brown	2.1	0.2	0.7	60	17	Pale yellow	slight	some	olive oil
Desj	1.9	1.0	1.4	60	17	Pale yellow	slight	none	olive oil
Desj	3.4	1.8	2.5	30	11	Lemon yellow	slight	some	olive oil
Brown	1.3	0.5	0.0	67	13	Deep yellow	Moderate	some	edestin
Brown	2.2	1.0	1.9	30	32	Colorless	slight		arrowroot starch
Brown	1.9	0.0	0.4	30	15	Lemon yellow	slight	some	5 c.c. oil 5 gm. edestin
Desj	2.8	0.7	2.3	15	11	Lemon yellow	slight	some	5 c.c. oil 5 gm. starch

TABLE III.

Enzymatic activities, amounts and physical character of duodenal contents obtained during the third stage of collection.

Subject	Enzymatic activity			Amt. in c.c.	Color	Viscosity	Presence of food	Kind of food ingested
	Proteolytic in mgm. NPN.	Lipolytic in c.c. N/10 NaOH	Amylolytic in mgm. glucose					
Cush	4.0	0.6	3.1		Pale yellow		none	casein
Ought	3.8	2.7	0.9	285	dark brown	moderate	none	casein
White	4.0	2.6	0.2	100	greenish yellow	slight	none	olive oil
McQ	1.2	0.6	0.1	240	pale yellow	slight	none	olive oil
Cush	5.5	4.3	4.3	115	dark greenish brown	moderate	2 c.c. oil	olive oil
Desj	1.5	0.6	2.9	200	golden yellow	moderate	none	olive oil
"	3.5	1.4	2.1	255	yellowish brown	" "	5 c.c. oil	olive oil
Brown	1.9	1.6	3.4	140	golden yellow	moderate	small amount	olive oil
Brown	2.3	2.7	2.6	108	brownish yellow	moderate	none	10 gm. edestin
Desj	2.8	1.2	2.0	87	lemon yellow	moderate	none	10 gm. edestin
Desj	3.2	1.5	3.2	75	brownish yellow	moderate	none	10 gm. arrow root starch
Brown	3.1	3.0	3.5	35	lemon yellow	moderate	none	10 gm. arrowroot starch
Desj	3.2	2.4	3.9	95	yellowish brown	moderate	none	5 c.c. olive oil 5 gm. arrowroot starch
Brown	3.8	0.4	3.1	8	pale yellow	slight	none	5 c.c. olive oil 5 gm. arrowroot starch

tained during the *first stage of collection.* A total of thirteen duodenal contents from six subjects was studied and the findings outlined (Table II).

The findings outlined in the above table show that immediately after the ingestion of pure food substances in volumes of 50 c.c., the color and viscosity of the duodenal contents remained similar to those of the fasting contents. But after the lapse of periods varying from 9 to 32 minutes, and 45 minutes in one subject not noted in the table, an abrupt change to a markedly deeper bile color occurred. Before this change in color took place, if casein, edestin or oil had been ingested, food appeared in the duodenal contents. The presence of food was noted either immediately after its ingestion or within a period of 20 minutes, but the change in the color of the bile did not occur for from 7 to 32 minutes after the initial appearance of this food in the duodenal contents. As far as can be judged, there was no increase in the quantities collected over those obtained from the fasting duodenum. The proteolytic activity varied from 0.8 to 4.3 mgms., the lipolytic from 0.0 to 2.2 c.c., and the amylolytic from 0.0 to 3.1 mgms. These variations are comparable to those found in the fasting contents. So that the duodenal contents collected from immediately after the ingestion of food up until the abrupt change to a deep bile color, and those obtained from the fasting duodenum are comparable except for the presence of food in the former.

Studies were next made on duodenal contents collected during the second hour after the change from pale yellow to a deep bile color occurred; *i.e.*, the *third stage of collection.* The results obtained are outlined (Table III).

Study of the table shows that the specimens were some shade of light yellow, with the exception of two specimens which were dark brown. All specimens were moderately viscid but three, which were slightly so. Food was present in three of the specimens. Proteolytic activity varied from 1.2 to 5.5 mgms., lipolytic from 0.6 to 3.0 c.c., and amylolytic from 0.1 to 4.3 mgms. These findings are comparable to those obtained in the fasting duodenal contents, and in those collected immediately after the ingestion of food, except for the increase in viscosity, and the occasional presence of food. (The findings will be discussed later.)

The collection of duodenal contents for the first hour after the abrupt change to dark-colored bile occurred is called the *second stage of collection,* or the first hourly specimen. The enzymatic activities, physical character and quantities of duodenal contents obtained during this second stage of collection are outlined in the following table (Table IV).

All duodenal contents outlined in the above table were deeply bile colored, in which respect they differed from the great majority of duodenal contents previously described in Tables I, II, and III. The viscosity was much greater than was found in contents derived from the fasting duodenum or collected immediately after the ingestion of food, but not more so than was usually found in specimens obtained during the third stage of collection. The amounts of duodenal contents collected varied from 42 c.c. to 270 c.c. Proteolytic activity varied from 2.7 to 5.7 mgms., lipolytic from 1.0 to 4.4 c.c., and amylolytic from 2.5 to 4.5 mgms. of glucose. Comparison of the figures with those represent-

TABLE IV.

Enzymatic activities, amounts and physical character of duodenal contents obtained during the second stage of collection.

Subject	Enzymatic activity: Proteolytic in mgm. NPN.	Enzymatic activity: Lipolytic in c.c. N/10 NaOH	Enzymatic activity: Amylolytic in mgm. glucose	Amt. in c.c.	Color	Viscosity	Kind of food ingested
Desj	3.2	1.8	3.6	270	very dark brown	Moderate	10 c.c. olive oil
Brown	3.9	2.4	4.5	125	very dark brown	" "	10 c.c. olive oil
Desj	2.7	1.5	2.5	140	deep brownish	" "	10 gm. edestin
Brown	3.3	1.8	2.4	105	deep brownish yellow	" "	10 gm. edestin
Desj	3.0	1.0	3.3	100	light brownish yellow	" "	10 gm. arrow root starch
Brown	2.4	1.4	2.5	100	light brownish yellow	" "	10 gm. arrow root starch
Brown	4.7	2.0	3.5	95	deep yellowish brown	" "	5 gm. edestin, 5 gm. arrow root starch
White	4.3	1.2	2.0	42	blackish	" "	25 c.c. olive oil
Cush	3.5	3.3	4.3	90	" " " "	" "	" " " " " " " "
McQ	5.6	4.4	3.0	80	" " " "	" "	" " " " " " " "
Ought	5.7	3.5	2.6	135	" " " "	" "	" " " " " " " "
Desj	4.0	1.8	2.6	200	" " " "	" "	" " " " " " " "

ing the minimum and maximum enzymatic activities of the fasting duodenal contents (Table I), and of those obtained during the first and third stages of collection (Tables II and III) are given in the following table (Table V).

TABLE V.

Minimum and maximum degrees of enzymatic activities of fasting duodenal contents and of contents obtained during the first, third and second stages of collection.

Time of collection of duodenal contents	Enzymatic activity					
	Proteolytic in mgm. NPN.		Lipolytic in c.c. N/10 NaOH		Amylolytic in mgm. glucose	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Fasting duodenum	1.2	5.0	0.0	2.7	0.3	6.7
First stage collection	0.8	4.3	0.0	2.2	0.0	3.1
Third stage collection	1.2	5.5	0.6	3.0	0.1	4.3
Second stage collection	2.7	5.7	1.0	4.4	2.5	4.5

The figures in the above table, representing the maximum degrees of enzyme action, show that considerable degrees of activities may be present in duodenal contents collected at any period; while those for minimum action show that activity may or may not be manifested. But the degrees of enzyme activity shown by the figures for minimum action of the various types of enzymes in the duodenal contents obtained during the second stage of collection are much greater than those shown for the minimum action in specimens collected at other periods. The significance of this finding will be discussed later.

Observations were made in order to determine the relative enzymatic activities of fractions of the duodenal contents obtained during the second stage of collection. For this purpose three subjects were fed a mixture consisting of 25 gms. casein and 25 c.c. water. After the dark colored bile appeared the first fractions of duodenal contents were collected over periods of 7 minutes, 15 minutes and 16 minutes; the next over periods of 33, 34 and 15 minutes, and of 45 minutes in one. The results obtained are outlined in the following table (Table VI).

TABLE VI.

Enzymatic activities of fractions of duodenal contents obtained during the second stage of collection after the ingestion of casein.

Subject.	Enzymatic activity			Amt. in c.c.	Period of collection in minutes.
	Proteolytic in mgm. NPN	Lipolytic in c.c. N/10 NaOH	Amylolytic in mgm. glucose		
Ought.	5.5	4.0	1.0	55	15
	4.2	2.0	1.0	165	33
White.	4.7	3.2	1.9	35	16
	4.9	3.2	1.4	50	34
Cush.	3.7	1.8	2.0		7
	3.4	1.7	1.0		15
	3.5	1.4	3.5		45

Study of the table (Table VI) shows that, in the different fractions of duodenal contents collected from the same subject, the degrees of action of the same type of enzyme did not vary widely, except in the two following instances. The lipolytic activity of the first fraction obtained from subject Ought is twice that of the second fraction; and the amylolytic activity of the third fraction from subject Cush is much larger than those of the first two fractions. None of the figures fall below those given for minimum enzymatic activities of duodenal contents obtained during the second stage of collection as outlined in Table IV. It will be recalled that the second stage of collection began with the appearance of dark-colored bile; therefore, the increase in the flow of enzymes into the duodenum and the beginning of the flow of bile were about coincident.

A synopsis of the results of the foregoing observations is given as follows: Duodenal contents obtained from the fasting duodenum, and during the first and third stages of collection are comparable, except for the greater viscosity of the specimens of the third stage of collection. The enzymatic activities of the specimens vary from little or no activity to considerable degrees of activity. When compared with these specimens, those obtained during the second stage of collection were much darker in color, and the minimum degrees of enzyme action were all much greater. The fractions of duodenal contents collected during the second stage from the same subject showed fairly uniform degrees of activity for each type of enzyme. An increase in the flow of enzymes and bile into the duodenum occurred approximately at the same time.

Pure food substances were used in the study to determine the effects of various foods on the relative concentrations of enzymes present in the duodenal contents, as estimated by degrees of enzyme action. The pure substances were edestin, arrowroot starch and olive oil. When fed singly, 10 gms. of each substance were used; when given in combinations of twos, 5 gms. of each were mixed; when all three were mixed,

3 1/3 gms. of each were used. To each preparation fed enough water was added to make a bulk of 50 c.c. The arrowroot starch was dissolved in hot water, forming a gelatinous paste, before it was fed. The results are given in the following table (Table VII).

TABLE VII.

Enzymatic activities, amounts and physical character of duodenal contents derived from pure food substances, fed singly and in combinations.

Subject	Enzymatic activity			Amt. in c.c.	Color	Viscosity	Kind of food ingested
	Proteolytic in mgm. NPN.	Lipolytic in c.c. N/10 NaOH	Amylolytic in mgm. glucose				
Brown	3.9	2.4	4.5	125	very dark brown	Moderate	10 c.c. olive oil
	3.3	1.8	2.4	105	dark brownish yellow	Moderate	10 gm. edestin
	2.4	1.4	2.5	100	brownish yellow	" "	10 gm. arrow root starch
	4.7	2.0	3.5	95	dark yellow brown	" "	5 c.c. olive oil and 5 gm. edestin
	5.0	0.7	2.9	65	yellowish brown	" "	5 1/3 c.c. olive oil, 3 1/3 gm. edestin, 3 1/3 gm. starch
Desj.	3.2	1.8	5.6	270	very dark brown	Moderate	10 c.c. olive oil
	3.4	1.5	3.6	140	dark brownish yellow	" "	10 gm. edestin
	3.0	1.0	3.3	100	yellowish brown	" "	10 gm. arrow root starch
	3.4	1.2	3.1	110	yellowish brown	" "	5 gm. arrow root starch, 5 c.c. olive oil
	6.5 2.1	0.0 0.8	3.7 2.1	90	brownish yellow	" "	5 gm. arrow root starch, 5 gm. edestin

As outlined in the above table, the viscosity of the various specimens was about the same. After the ingestion of oil the duodenal contents were very dark green in color, after edestin brownish yellow and after starch yellowish brown. Thus, each pure food substance gave rise to a characteristic color in the duodenal contents. The mixtures of those foods which contained oil gave rise to duodenal contents of yellowish brown color, while the contents from the starch and edestin mixture were brownish yellow. The largest quantities of duodenal contents were collected from the oil, the next largest from the edestin, less from the starch and the smallest amounts from the food mixtures. Lipolytic activity was greatest in duodenal contents derived from the oil, next greatest in those from edestin and least in those from the starch; while in the contents from the mixtures of oil and starch and of oil and edestin lipolytic activity was of average amount. Thus, in these two subjects the ingestion of oil was followed by the greatest degree of action of the enzyme specific for fat. But this specific relation did not hold for the proteolytic and amylolytic activities after the ingestion of the edestin and starch. In general the figures representing proteolytic and amylolytic activity are comparable in the different specimens of duodenal contents derived from the two subjects. After the ingestion of the mixtures of olive oil, edestin and starch and of starch and edestin lipolytic activity was reduced, and on one occasion absent.

Further comparative studies of enzymatic activities of duodenal contents were made on three subjects after the ingestion of olive oil and of casein. For this purpose the subjects were fed a mixture of 25 c.c. olive oil and 25 c.c. tap water and a mixture of 25 c.c. bulk of casein and 25 c.c. tap water. The results obtained are outlined in the following table (Table VIII).

TABLE VIII.

Enzymatic activities of duodenal contents derived from olive oil and from casein during the second stage of collection.

Subject.	Enzymatic activity.			Kind of food ingested.
	Proteolytic in mgm. NPN.	Lipolytic in c.c. N/10 NaOH.	Amylolytic in mgm. glucose.	
Ought	4.2	2.0	1.0	Casein
	5.7	3.5	2.8	Olive oil
White	4.9	3.2	1.4	Casein
	6.0	4.8	4.3	Olive oil
Cush	3.5	1.4	3.5	Casein
	3.5	3.3	4.3	Olive oil

Study of Table VIII shows that duodenal contents derived from oil presented greater degrees of lipolytic action than those derived from casein. These findings confirm those discussed above (Table VII) which show that lipolytic activity is greater in duodenal contents derived from olive oil than in contents derived from casein, edestin and starch meals.

Comparative studies of the degrees of enzymatic action were made in duodenal contents derived from the fasting duodenum, after the ingestion of tap water and after drinking cornstarch solution. For this purpose the fasting contents were collected over periods of thirty minutes, then 50 c.c. of tap water were given and the contents collected over periods of 40 to 60 minutes, and after this 50 c.c. of 0.5 per cent. cornstarch solution were ingested by two of the subjects and the duodenal contents collected for one hour. After the ingestion of water, by the three subjects to whom no cornstarch was given, the duodenal contents were collected for two hours; in fractions of one hour each. The enzymatic activities of the two fractions were similar. The results obtained from this comparative study are outlined in the following table (Table IX). To the table are added the figures representing the enzymatic activities of duodenal contents collected after the ingestion of a mixture of olive oil and tap water. The experiments with the oil feedings were made on days different from those with the fasting duodenum and tap water feedings.

TABLE IX.

Enzymatic activities and amounts of duodenal contents collected from the fasting duodenum and after the ingestion of tap water, or of corn starch solution or of olive oil.

Subject.	Enzymatic activity.			Amt. in c.c.	Period of collection in minutes.	Kind of food ingested.
	Proteolytic in mgm. NPN.	Lipolytic in c.c. N/10 NaOH.	Amylolytic in mgm. glucose.			
McQ	2.5	0.4	1.8	58	30	Fasting duodenum
	3.8	2.8	1.1	97	60	50 c.c. tap water
	5.6	4.4	3.0	80	48	25 c.c. olive oil and 25 c.c. tap water.
Ought	1.8	0.5	0.3	15	30	Fasting duodenum
	1.5	0.1	0.0	52	45	50 c.c. tap water
	2.7	0.0	0.0	120	60	50 c.c. 0.5% cornstarch
	5.7	3.5	2.6	100	60	25 c.c. olive oil and 25 c.c. tap water.
White	3.7	1.0	0.8	2	30	Fasting duodenum
	2.0	0.1	0.0	105	40	50 c.c. tap water
	3.3	1.4	0.2	80	60	50 c.c. 0.5% cornstarch
	6.0	4.0	4.3	100	60	25 c.c. olive oil and 25 c.c. tap water.
Brown	5.9	0.5	1.9	18	30	Fasting duodenum
	3.0	1.1	0.8	39	60	50 c.c. tap water, 5 gm. barium sulphate.
	3.9	2.4	4.5	120	55	10 c.c. olive oil and 40 c.c. tap water.
Desjar	1.9	1.1	1.9	25	30	Fasting duodenum
	3.0	0.5	2.0	80	60	50 c.c. tap water, 5 gm. barium sulphate.
	3.2	1.8	3.6	270	63	10 c.c. olive oil, 40 c.c. tap water.

In the above table (Table IX) comparison of enzymatic activities of the contents of the fasting duodenum and after drinking water shows that proteolytic activity was diminished in three and increased in two; lipolytic activity was decreased in two; amylolytic activity was diminished in four and slightly increased in one. In duodenal contents derived from cornstarch proteolytic activity was increased in one and decreased in one and the same held true for lipolytic activity. Thus, after the ingestion of water or weak cornstarch solution the degrees of action of the various enzymes present in the duodenal contents may be diminished or increased, as compared with the activity of those present in the fasting contents. However, after the ingestion of olive oil degrees of action of all these various enzymes were increased in the contents of each subject. These findings are portrayed in the following table (Table X). To the table are added the minimum and maximum figures for enzymatic activities after the ingestion of casein or edestin by four of the subjects.

The findings in Table X show: 1, that the en-

TABLE X.

Minimum and maximum enzymatic activities of fasting duodenal contents and of contents derived from water, from 0.5 per cent. corn starch solution and from olive oil.

Kind of food ingested.	Enzymatic activity					
	Proteolytic in mgm. NPN.		Lipolytic in c.c. N/10 NaOH		Amylolytic in mgm. glucose.	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Fasting duodenum	1.2	8.0	0.0	2.7	0.3	6.7
Water (50c.c.)	1.5	5.8	0.1	2.8	0.0	1.1
Cornstarch (50 c.c.)	2.7	3.3	0.0	1.4	0.0	0.2
Olive oil and water (50 c.c.)	5.2	5.7	1.8	4.8	2.0	4.5
Casein or Edestin (50 c.c. bulk)	3.3	4.9	1.4	3.2	1.0	3.6

zymatic activities of duodenal contents derived from water or cornstarch solution are comparable to those present in the fasting contents; and 2, that much greater minimum degrees of enzyme action were present in duodenal contents collected after the ingestion of olive oil, of casein and of edestin.

A study of the enzymatic activities and hydrogen ion concentrations* of duodenal contents collected over hourly, and in some instances 15 minute periods, was made. The collections were carried out for four hours with each subject. For the purpose of this study five subjects were fed a mixture of milk, cottage cheese and 40 gms. barium sulphate, and two subjects 20 per cent. cream and 40 gms. barium sulphate. Each meal consisted of a volume of 300 c.c. The minimum emptying time of the stomach was about four hours, so that each specimen of duodenal contents was collected while food was passing out of the stomach. Within a few minutes after a subject had ingested a meal, deeply bile colored duodenal contents were returned through the tube; and these contents contained barium and food in easily demonstrable amounts. More or less food and barium were obtained in all the duodenal contents collected after the ingestion of these meals. In three subjects the contents collected during the first hour were fractioned into four parts, each part covering a period of 15 minutes. The results obtained in this series of experiments are outlined in the following table (Table XI).

Study of Table XI shows that the enzymatic activities were generally comparable to those in duodenal contents obtained during the second

TABLE XI.

Enzymatic activities and pH of duodenal contents collected over periods of 15 minutes and one hour, after the ingestion of milk and cottage cheese and of cream in volumes of 300 c.c.

Subject	Proteolytic activity expressed in mgm. nonprotein nitrogen in specimen collected during				Lipolytic activity expressed in c.c. of N/10 NaOH in specimen collected during				Amylolytic activity expressed in mgm. of glucose in specimen collected during				pH of specimens collected during				Kind of food ingested
	1st hr	2nd hr	3rd hr	4th hr	1st hr	2nd hr	3rd hr	4th hr	1st hr	2nd hr	3rd hr	4th hr	1st hr	2nd hr	3rd hr	4th hr	
A	3.9*				2.6*				2.7*				5.2				
	2.9*				1.5*				1.6*				4.5				
	1.0*				0.0*				0.8*				4.1				
	2.6*	3.9	2.3	2.4	1.4*	2.5	1.8	1.4	1.4*	2.1	0.8	1.8		4.3	5.0	5.6	
B	3.0*				1.6*				1.3*								• • •
	3.4*				2.0*				1.0*								
	1.7*				0.6*				0.7*								
	3.0*	4.2	5.2	5.2	1.6*	2.4	1.7	1.8	1.5*	1.1	1.6	2.3		6.4	7.1	7.0	
C	4.8*				2.4*				3.4*								
	3.0*				2.8*				2.7*								• • •
	3.0*				3.0*				3.4*								
	3.1*	4.0	4.2	4.7	2.8*	2.1	1.4	1.8	3.4*	2.0	0.9	1.5					
D	3.9	2.7	3.1	3.7	2.0	1.0	1.8	1.5	1.7	0.8	1.0	1.0	5.1	4.8		4.0	• • •
E	2.5	3.2	4.4	5.5	1.9	1.7	2.0	2.9	1.1	1.9	1.4	1.4					" " "
J	3.4	3.0	3.0	3.5	3.0	2.3	2.8	2.2	1.9	1.9	2.4	2.4	5.1	6.1	6.8	6.2	20 per cent cream
H	4.5	4.1	2.8	3.5	3.9	3.0	2.3	2.9	3.6	3.0	2.2	2.6					• • •

x Specimens collected over 15 minute periods.

stage of collection, after feeding the pure food substances (see Table IV). The enzymatic activities of the 15-minute specimens were comparable to those of the succeeding hourly collections, except for the third 15-minute specimens in subjects A and B. These two specimens were grayish instead of yellow in color, which showed a considerable dilution with material from the stomach; and this undue dilution explains the low degrees of enzyme action present in the specimens. The same type of enzyme varied moderately in the degrees of its action in the different hourly specimens of duodenal contents from the same subject, but there was no regular manner in which the variations occurred; that is, there was no systematic increase in the enzymatic activities from the first to the fourth hours, except for the proteolytic activity in subjects B, and E.

The findings discussed in Table XI show that the enzymatic activities of duodenal contents, as

* Hydrogen ion concentrations were determined by a potentiometer constructed by the authors under the direction of Dr. Bovie, of the Harvard Cancer Commission. Dr. Bovie's quadrant electrometer was used.

estimated under the experimental conditions used, remain relatively constant for each type of enzyme as long as the stomach is in the process of emptying itself of food. From this finding it is inferred that the amounts (concentrations) of the enzymes remained relatively constant.

The hydrogen ion concentration determinations demonstrate that no relation existed between the degrees of acidity of the duodenal contents and the degrees of enzyme action.

DISCUSSION.

Enzymes present in duodenal contents may be derived from the pancreas, from the stomach, possibly from saliva and perhaps from duodenal mucosa. However, the methods used in the work here reported, when applied to the study of enzymatic activities of duodenal contents derived from patients,* show that all but very small degrees of enzyme action are absent when diseased processes have excluded pancreatic secretion from the duodenum. Thus, the enzymes demonstrated by these methods probably originate almost exclusively, if not entirely, in the pancreas. For this reason demonstration of enzymatic activity in duodenal contents indicates the presence of pancreatic secretion; and in the discussion of the work here reported it will be assumed that the various enzymatic activities demonstrated represent the action of enzymes secreted by the pancreas.

In patients* with complete obstruction to the common bile duct it has been found that the absence of bile does not demonstrably influence the activity of enzymes of duodenal contents as estimated by the procedures employed. Furthermore, addition of human bile to duodenal contents did not increase the activities of the enzymes, as demonstrated by the methods used. Theoretically, this is what would be expected with the methods, in view of the physical conditions under which the enzymes act. Because of these findings it is considered that the presence of different amounts of bile had a negligible influence on the activities of the various enzymes, as determined by these methods.

The term "fasting" duodenal contents designates the contents obtained from the duodenum about fifteen hours after the last ingestion of food and about nine hours after the last drink of water. But in taking the duodenal tube subjects swallowed much saliva; and it is also well known that the normal fasting stomach contains more or less acid secretion, cellular debris and mucin. Undoubtedly the stomach throws these materials over into the duodenum, so that a truly fasting state of the stomach and duodenum was not present during the course of the experiments here reported. Just what rôle the presence of these materials, or of the tube, in the duodenum played in the production of the presence of enzymes in the duodenal contents, was not determined. All that can be concluded is, that, under the experimental conditions here reported, proteolytic and amylolytic activities were always present in duodenal contents; while lipolytic activity was occasionally not demonstrable.

Enzymatic activities of duodenal contents obtained during the third stage of collection (Table III) were generally comparable to those obtained in fasting duodenal contents (Table I). It is considered that not infrequently the stomach had emptied itself of food during the second stage of collection; so that during the third stage the contents collected were often fasting contents. However, many observations* show that the normal stomach empties at different rates in different persons; and it was demonstrated that the stomach, during the experiments here reported, was not always empty at the time of the third stage of collection. Thus, at times the duodenal contents collected during the third stage represented the same conditions as were present during the second stage of collection; and under these conditions the enzymatic activities of the third and second stages were always found to be comparable.

It will be noted that the fasting duodenal contents at times showed degress of enzyme action comparable to those found in duodenal contents obtained during the second stage of collection or after the ingestion of food mixtures of 300 c.c. volume (compare maximum figures of Table V and figures of Table XI with those of Table I). But the fasting contents were relatively undiluted, while those collected after the ingestion of food were diluted with bile and gastric chyme. Amounts of the latter were particularly large after the ingestion of meals of 300 c.c. volume, as judged both by the quantities of duodenal contents collected and the amounts of barium seen to be ejected from the stomach into the duodenum when observed through the fluoroscope. For this reason the enzymatic activities found in duodenal contents during the time the stomach was emptying itself of food represented greater concentration of enzymes than was present in the fasting duodenal contents.

During the second stage of collection the stomach was emptying itself of food, and duodenal contents obtained during this stage showed minimum degrees of enzyme action much greater than minimum degrees demonstrated in duodenal contents collected over other periods (Table V). From this it is concluded: 1, that during the second stage of collection increased concentration of enzymes was present in the duodenal contents; and 2, that during this stage the effect of the ingestion of food on pancreatic activity is shown. In other words, the findings show that the presence of food in the stomach and intestines in some way brings about the stimulation of the secretion of pancreatic juice.

Evidence of pancreatic stimulation was much less pronounced after the ingestion of water or

* Unpublished observations.

* Unpublished observations.

weak cornstarch solution than after the ingestion of foodstuffs (see Table X). Water[17] and cornstarch solution stimulate the secretion of acid gastric juice; so that after their ingestion acid fluid was ejected from the stomach into the duodenum. Because of this it is concluded that something more than the mere ejection of acid gastric contents into the duodenum is necessary to stimulate materially pancreatic secretion.

Not only was it demonstrated that food substances stimulate pancreatic secretion, but it was also demonstrated that lipolytic activity was greatest after the ingestion of olive oil, less after protein and least after carbohydrate (Tables VII and VIII). Furthermore, duodenal contents obtained after the ingestion of oil showed greater degrees of all types of enzymatic activity than did contents derived from protein. This last statement holds true for duodenal contents derived from four of the five subjects on whom these experiments were carried out (Tables VII and VIII). In the fifth subject the duodenal contents showed the greatest degree of lipolytic activity after the ingestion of oil, but proteolytic and amylolytic activities were comparable to those derived from a meal of edestin. Nevertheless, the findings show the existence of a relation between the degrees of enzyme action and the kind of food ingested.

It was found that lipolytic activity was diminished or absent after the ingestion of certain mixtures of the pure foodstuffs (Table IV). There is no reason to doubt that these mixtures called forth secretion of HCl in the stomachs of the subjects. At any rate, it was proved that the food mixtures were ejected from the stomach into the duodenum; and the acid fluid normally present in the fasting stomach would necessarily, also, be thrown over into the duodenum. If HCl were the principal factor in bringing about the secretion of pancreatic juice, it seems strange that at times it would fail to do so in normal persons. On the other hand, it is conceivable that the physical state of foodstuffs mixed with a gelatinous substance like arrowroot starch paste might be such as to render their digestion very slow. As a result little or no pancreatic secretion might be stimulated and only the activity of enzymes already present in the fasting duodenal contents would then be demonstrable. This may be the true explanation of the findings in the duodenal contents derived from the mixture of arrowroot starch, edestin and olive oil and from the mixture of arrowroot starch and edestin (see Table IV).

The findings in Table XI demonstrate: (1) that the enzymatic activities of duodenal contents did not show systematic increase as digestion progressed; from this it is inferred that the relative concentration of enzymes present did not increase proportionately. (2) the findings also show that no relation existed between hydrogen ion concentration (degrees of acidity in the duodenum) and the concentration of active enzymes in the duodenal contents.

It was found, after the ingestion of pure foodstuffs and the appearance of the latter in the duodenal contents, that from seven to forty-five minutes elapsed before an increase in enzyme action was noted. This observation is most easily made after the ingestion of olive oil and tap water. The oil will be collected constantly over periods varying from ten to forty-five minutes before an increase in enzymatic activities and the change to the dark bile occur. These observations show: (1) that after the appearance of pure foodstuffs in the duodenum there is a latent period before the flow of enzymes and bile is stimulated; while (2) the finding that the flow of bile and enzymes was coincident suggests a common stimulating factor.

During the period of latency four phenomena were probably occurring: (1) an increase in the hydrochloric acid concentration of the stomach contents; (2) the actions of gastric and salivary enzymes on foodstuffs present in the stomach; (3) the action of duodenal enzymes on foodstuffs ejected from the stomach into the duodenum; and (4) the absorption of the products of digestion. What effect increase in gastric acidity, which occurs as digestion progresses, had on duodenal acidity, was determined after the ingestion of milk and cottage cheese and after cream. No effect was found (Table XI). The significance of the absorption of products of food digestion will be discussed later.

The findings: (1) that something more than the mere ejection of acid gastric contents into duodenum was necessary to stimulate demonstrably the secretion of pancreatic juice, and (2) that no relation existed between the degrees of acidity (hydrogen ion concentrations) and the action of enzymes in duodenal contents are evidence that the acidity of duodenal contents was not the essential factor in bringing about the stimulation of the secretion of pancreatic juice. On the other hand, the findings: (1) that food in some way stimulated the secretion of pancreatic juice; (2) that a relation existed between the degrees of enzyme action and the kinds of food ingested; (3) that a latent period existed in which foodstuffs could be digested and absorbed; and (4) that water was a much less potent pancreatic stimulant than food, although water stimulates a normal gastric acidity, present evidence that the products of food digestion are an essential factor in stimulating the secretion of pancreatic juice.

The above interpretation of the findings in the experimental work here reported do not agree with the view of Pawlow, except for lipolytic activity. They do not uphold either the secretin theory of Bayliss and Starling or the hypothesis of a nervous mechanism as the most potent factors in the stimulation of the secretion of pancreatic juice. The remaining most probable possibility is that the products of the digestion of

food are the most important factor in stimulating the pancreas to secretory activity.

The disagreement with Pawlow's contentions may possibly be more apparent than real. In the first place Pawlow worked on dogs; and a pancreatic regulatory apparatus may exist in dogs which is different from that of man. In the methods used by Pawlow for demonstrating enzymatic activity the substrates acted upon by enzymes were placed directly into pancreatic juice. The hydrogen ion and buffer conditions of the various specimens of pancreatic juice may have been such as to give results justifying Pawlow's conclusions. But the physical chemistry of Pawlow's methods is so grossly erroneous that an interpretation of results obtained by them is well-nigh impossible.

The experiments of Bayliss and Starling consisted of intravenous injection into animals of hydrochloric acid extracts of duodenal mucosa. In this way pancreatic secretion was stimulated. But the work of von Fürth clearly demonstrates that it is not necessary to assume the existence of "secretin" to explain this stimulation. This investigator, among others, has demonstrated that various well-known chemical substances normally present in duodenal mucosa will produce such a stimulation. Furthermore, the maceration of duodenal mucosa and its extraction with hydrochloric acid might very well form compounds (due to decomposition of proteins, etc.) similar to those occurring during digestion; such compounds may play a rôle in the stimulation of pancreatic juice when injected into the blood stream of an animal. In other words, the chemistry of the work of Bayliss and Starling was such as not to justify the drawing of far-reaching conclusions from their observations.

Experiments have been repeatedly carried out by the present authors in which water, N/20-HCl, glucose solutions and olive oil have been introduced directly into the duodenum of men. The results were the same as those obtained after the ingestion of these substances by mouth. Certainly these substances were introduced into the duodenum in an inert chemical state, except the N/20HCl. This contradicts the often-quoted statement that such substances do not stimulate pancreatic secretion. From these experiments it was concluded that whenever any harmless liquid is introduced into the duodenum of man intestinal digestion and absorption begin.

The absorption of materials present in the duodenal contents and those coming into the duodenum from the stomach (for in man the introduction of fluid into the duodenum always starts up the ejection of stomach contents into the duodenum, as the authors have repeatedly demonstrated) could explain the often-quoted experiment of Popielski.[18] In this experiment hydrochloric acid solution was placed in the duodenum of one dog, whose blood supply was connected to that of another dog; as a result pancreatic juice was secreted by the latter. The contamination of the original duodenal material with gastric contents introduces an element of uncertainty, as digestible material thus present would give rise to products analogous to those produced by food digestion. In fact, all the work supporting the "secretin" theory furnishes only indirect evidence of the correctness of that theory; while phenomena urged in its support can all be explained in other ways by using well established facts as a basis.

This discussion is not intended to belittle the excellent work of two such competent experimenters as Drs. Bayliss and Starling. But the purpose is to emphasize that "secretin" remains a hypothetical substance. Furthermore, it should be emphasized that the work on "secretin" has all been carried out on the lower animals, and whether or not the same experimental results would be obtained in man has not been determined.

The principal conclusions reached in the above discussion may be summarized as follows:

1. The findings showed that the presence of food in the human intestines in some way stimulated the activity of the external secretory function of the pancreas. They indicate that the principal factor in producing this stimulation was the absorption of the products of digestion rather than the acidity of the gastric chyme.

2. Lipolytic activity of duodenal contents was always, while proteolytic and amylolytic activities were almost always, greater after the ingestion of olive oil than after the ingestion of protein or carbohydrate food. From this it is inferred that olive oil was a more powerful stimulant to the activity of the external secretory function of the pancreas than were the other types of food.

3. Water was a less potent stimulant of external pancreatic secretion than were food substances.

4. After the appearance of food substances in the duodenum there was a latent period before the flow of enzymes and bile began.

6. The time coincident of the onset of the flow of bile and pancreatic juice suggests a common stimulant.

7. Under the experimental conditions employed the fasting duodenal contents contained both enzymes and bile pigments.

We wish to express thanks to Dr. Lafayette B. Mendel for helpful criticism of the preliminary studies on which this work was based; and, also, to Dr. A. W. Rowe for his valuable coöperation.

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Suffolk District Medical Society.

MEETING ON "REHABILITATION."

The Suffolk District Medical Society held a meeting on "Rehabilitation" at the Boston Medical Library on November 22, 1922. The program was arranged by Dr. Hilbert F. Day, and the following speakers took part:

DR. F. J. COTTON, Boston: Reconstruction or rehabilitation, which was brought into prominence by the war, is being carried over into civil life and industry. It is a field the importance of which is just beginning to be recognized and its scope broadened. The problems are similar to those encountered in the war, namely to save the derelicts of industry. Everybody dealing with the subject from the surgical side is impressed with the fact that the cases are due to bad surgery and are avoidable. What we ought to have is a better type of surgery which will make correcting the mistakes of others unnecessary. For instance, cases of fracture of the os calcis which go through the ordinary routine and are crippled, are picked up in the reconstruction work and brought back to normal. Then there are cases of Colles' fracture which often have a permanent partial or total disability. We can handle those cases late and straighten them out very well, although it should be unnecessary. Of course, results obtained late are not comparable to results at the time of injury.

An important part of the work of rehabilitation is bridging the patient over from the time of injury to his return to the pay-roll. The average surgical case receives surgical treatment only and is discharged unfit to go back to work. The medical man should be called in, also the orthopedist, the physiotherapist and the man who knows occupational therapy. We need team work. Take, for example, a man of fifty with a fractured femur or any case requiring a long period of treatment. Such cases are not cases for surgical reconstruction alone but cases for team work rehabilitation. The success of rehabilitation depends on proper team work. This is purely a team work proposition. My own feeling is that we are going to have institutions for this sort of thing where a man can be taken care of during the period of convalescence with a view to his rehabilitation to industry.

THE STATE INSTITUTIONS.

DR. JOHN H. NICHOLS: In the Industrial Departments of the State Institutions we have the inmates engaged in carpentry, basket making, weaving, mending, farming, etc. The work is assigned; hours of work are fixed. Industrial employers hire men who are 75 percent plus efficient, but men who are only 50 percent efficient are outcasts. It seems to me that the problem of finding a market for their wares is harder than finding work for the inmates.

I would present two viewpoints: The first, the more difficult, is to promote successfully a "back to the country," "back to the farm" movement. Even the cripple insists on going back to the city. On the farm there is always something that the cripple can do and be self-supporting. But now the unfortunates and crippled can scarcely earn a livelihood on the farms in this Commonwealth. Movements for small farms and gardens should be promoted and reclamation of waste land. The physicians could then send patients out on farms for rehabilitation where they could help to raise farm products. We might call them "heliotherapy" farms.

The second viewpoint which especially bears on the problem is a city problem. Why not erect a building in the city for these cripples who are loafing or selling pencils on the street? Call it a service shop or accommodation shop where cripples can go and do repair work and mending and all sorts of light work. Have a building centrally located which could serve as an employment office and as a clearing house for the sale of articles made by cripples.

CERTAIN LEGAL ASPECTS.

JOSEPH A. PARKS, ESQ.: Rehabilitation is the biggest problem under the Workmen's Compensation Act, bigger than the matter of compensation. I want to take up the problem of the cripple after he has left the hands of the doctor. He has got stale. Take the case of a man who has lost an arm, a hand or fingers — how are you going to get such a man back into industry? You can't unless you have the whole-hearted support of the employers of labor in this Commonwealth. Few employers are kind enough to employ such men. The result is that the cripple drifts about from job to job, his physical condition getting worse. Employers should coöperate with the Board and with the doctors. The sum of $7,000,000 is paid out every year for compensation insurance and for doctors' bills, and there is no reason why $1,000,000 cannot be clipped off that sum by the proper coöperation on the part of employ-

ers, and at the same time have a reduction in the amount of premiums paid. As a business proposition we can demonstrate to employers that an injured workman isn't a liability but an asset and will do just as much work if given an opportunity and the right kind of sympathy. We want the employers of labor in this State to coöperate with us in this great movement.

PHYSIOTHERAPY.

DR. FRANK B. GRANGER, Boston: From a consideration of the civil army of the industrially incapacitated the high lights are: 1. The necessity of team work between the branches of surgery and medicine, including the laboratory, social work and occupational therapy; 2. The importance of functional cure or restoration; 3. The economic gain due to shortening the period of disability; 4. The restoration to productive, remunerative work of many who would otherwise be permanently crippled and a burden to the community. All measures of value should be employed. Active exercises, in-door and out-door games, and passive exercise in the form of massage; physiotherapy, hydrotherapy, electrotherapy and heliotherapy—one or more combined where indicated.

Measures used—type of current: 1. Diathermy or internal baking. This modification of the high frequency current is useful where it is desired to secure deep seated effect on the tissues. 2. Ionization—this is analogous to commercial electroplating and is a means of introducing certain chemical salts. 3. Sinusoidal current—this is of value in restoring muscle tone. 4. Galvanism—this is useful for relief of pain and for nerve stimulation. In hydrotherapy the whirlpool bath is efficacious. Instead of medical massage the use of competitive games has proved of value in many conditions such as paralysis, hysteria, neurasthenic states, and certain types of cardiac disease. In fractures use the high frequency current at the time of complete union. In non-union use diathermy. For adherent scars use radiant heat. Arthritis—use radiant heat. Contusions respond to diathermy and to the Bristol coil. Physiotherapy should be carried out under the direction of trained technicians and is a challenge to the various cults.

OCCUPATIONAL THERAPY.

DR. JOHN D. ADAMS, Boston: Occupational therapy is what the name implies—the idea of occupying the patient in the hospital wards in order to hasten his convalescence, restore his function, and mentally restore him to his former state of mind. It is not a diversion but a treatment applied in conjunction with the doctor. What is the present status of occupational therapy? A school was organized in Boston, graduated 100 occupational therapy aides, girls, who were sent to France, who demonstrated their efficiency. The period of convalescence of the patients over there was reduced 30 percent. The school was perpetuated, a board of managers was organized. These girls, who are students of the occupational therapy school, are taken from all walks of life. An educational standard is required. These girls are taking it up as a means of livelihood. The course is twelve months. Today there are seven well established, well recognized schools in the United States. These girls go into the hospitals and teach the patients the various arts and crafts, among which are toy making, jewelry making, basketry, etc. These girls teach the patients to make these products. What is done with the products? We have established a bureau in Boston on Berkeley Street, where the products are sold. The bureau charges a commission of 15%. A State Society has been organized. Dues are $3 a year. We have at the present time about 300 members. Our State director, Miss Robeson, sent out questionnaires to all the hospitals in the State. Only 57 replied. Of those 57 only 32 make active use of occupational therapy at the present time.

DISCUSSION.

DR. FRANCIS W. ANTHONY, Haverhill: There are two methods of solving the problem, the ideal and the practical. We have to make our work conform to the practical. The ideal result is economic, functional restoration not necessarily to a point beyond the normal point of the individual. I claim that to determine this we must have more than a knowledge of the man's injuries, more than the surgical or medical picture. We must have a knowledge of the individual and know his mental status. We must know his mental ability, his experiences, his personal reactions, his environment; we must have all that combined with the knowledge of the surgical condition, then we can treat the individual. This means group study which must be centrally controlled. After your study is completed, what can be done for the patient? He may be helped at home, especially if near a central station; he may be helped in a general hospital or in a special hospital. I believe that the best place is a special hospital, a special hospital not under State or national control, especially not politically controlled,—the worst kind of control,—but a hospital especially endowed; that would be the ideal. What is practical? A reference board. There you enter medical politics. It seems to me that the thing must now function through the Accident Board. The reference board, taking the case up, would decide where to send the case to obtain the best results.

THE INDUSTRIAL SIDE.

DR. FRANCIS D. DONOGHUE, Boston: When Mr. Parks says that $1,000,000 can be clipped off in premiums, I want to make it clear that he means $1,000,000 paid by the employers and not $1,000,000 off the doctors' bills. The Compensation law is a compromise between the ideal and the possible. The insurance companies have seen that adequate medical treatment is the best kind of compensation. I have no doubt that accident cases are treated better than the average hospital case. The family doctor should come in. The compensation case is treated two weeks and, if it is an unusual case, longer, and the insurance companies usually pay for a longer medical treatment. The case that comes to the Industrial Accident Board is 40 years old, the average case, and our replacement doesn't require elaborate therapy because the men want quick replacement and not rehabilitation.

CERTAIN MEDICAL AND MENTAL ASPECTS.

DR. E. K. BURBECK (ms.): The physician should understand more than pharmacology; he should know functional diseases, inherited tendencies, effects of environment and development. Inherited tendencies we cannot change. To understand childhood training and environment is to understand some mental conditions in adult life. From the mass of endocrinology stands out the effect of secretions on the body growth. Faulty bodily mechanics has been shown to produce definite medical defects in the child as well as in the adult. Deficient muscular tone can be counteracted and improved while the patient is in bed. Muscular and breathing exercises are necessary, especially in digestive disturbances. A patient should not be allowed to get up out of bed with his muscles flabby. We should pay particular attention to the patient's morale and give encouragement also gauge the patient's powers by a study of the various organs and by blood pressure measurements, by metabolism, etc.

DR. JAMES W. SEVER, Boston: In regard to orthopedic surgery—the pathetic side of it is that most of the cases which require orthopedic treatment are cases we should never see, due to the fact that preliminary reconstruction surgery has not been properly carried out.

There are four or five general conditions which all of us dealing with the rehabilitation or reconstruction of a disabled person should know. Classified under five headings they are: 1. The physical condition, that is, we should know the physical condition of the individual and his capacity; 2. The mental condition, whether his mental attitude is right or not, and his capacity; 3. His economic standing and responsibility in the community. 4. His training, either his physical training or his training in regard to the industry in which he is working, for the possibility of leading up to a suitable employment either in good health or debilitated health; 5. His debilitated state. Speaking of reconstruction, I didn't quite understand Mr. Parks. He said that when they left the hands of the doctors they needed a helping hand. Just what he meant, I don't know. I believe in two things, the ideal and the practical—the possible. I think we should give adequate treatment in the hospitals and after they leave the hospitals. Patients are put into the hospitals with the idea of getting them out. They should be followed up from start to finish as are private patients. It would be a tremendous expense. The insurance companies have no follow-up: they are afraid to get into it because of the expense it would involve. The term "replacement" in industry I think is better than "rehabilitation."

Speaking of the "back to the farm" movement, I have a patient, a boy with infantile paralysis, who works on a farm and runs a tractor. I think a lot of this replacement comes down to the old sergeant's point of view, which is just "plain guts."

DR. ROBERT J. GRAVES, Concord, N. H.: Reconstruction on the Boston & Maine was about to be born when the strike hit us and had to lie dormant. We find it hard to concentrate patients in one place, to take them a distance from their homes. We are forced to get along with the best aides we might have. One of our principal difficulties arises with cases in Boston. A man is more fortunate if he doesn't get injured in Boston for he will have more individual attention and care. We don't have the difficulty of replacing men because we have a good many types of job. Our difficulty lies in what the unions will let us do. We are finding that the time of disability is very much shortened over what it was when the old system was in vogue before the striks. The new men do not lay off as long as the older men did for similar injuries.

DR. A. H. PIERCE, Boston: Dr. Anthony spoke about politics. Politics doesn't enter into the Veterans' Bureau at West Roxbury. At West Roxbury we have nervous and mental cases, and our problem is sometimes one of custodial care. A patient is given a thorough overhauling, a thorough history is taken, and a thorough mental examination is made and a thorough social service history is obtained With those things the day's routine is planned. It comprises a whole day of occupation, half of which is occupational therapy, so-called, and the other half is exercise and amusements which run into the evening. The occupational therapy consists of the ordinary run of basketry, toy making and weaving and some painting. It is

done partly in the crafts shop and partly in the wards. In addition they have prevocational training which consists of education. The whole scheme is therapeutics, but in so far as it may enter into vocation later, it is planned so that the subjects of the grammar and high schools are taught. Draughtsmanship is taught and agriculture and various other subjects. We have eight or ten acres, and I am trying to get a green-house. In addition we have an up-to-date equipment for physiotherapy. Then there is the personal touch of the ward surgeon with the patient. It is fundamentally psychoanalysis, although I don't like to use that term.

DR. JOHN BRYANT, Boston: I have tried to find out how this convalescence program can be worked out better in civil life. The time factor is important, whether we are working on the patient on a ten-day basis, or whether the changes involve weeks or months of treatment. The only solution is a series of convalescent hospitals where all these different factors can be run together simultaneously with a director of the group who is familiar with all the possibilities of the various parts of the group.

About occupational therapy, the emphasis has been put upon arts and crafts. Arts and crafts is only the elementary phase of the occupational therapy work, and if one stops at that, one does not use all the efforts. If a patient gets through the acute stage, the arts and crafts stage is desirable for the first process of interesting the patient in his surroundings again; but that must be succeeded by a stage in which there must be something more serious to be considered by the patient who must do some work in the world. The highest phase of occupational therapy must be connected with the patient's mental aspect and the job he is going to do when he is discharged, and the biggest thing an ocupational aide can do is to give the patient something which will make him better able to earn a living and make him feel that his hospital experience was not a waste of time. I saw in the Army a great many men who were raised from the labor status to an artisan status. The work which I found most valuable and most easily adaptable is apparently paid little attention to, and that is straight academic work; and it was extraordinary to find how glad these fellows were to choose academic work. At Upton the cases were cases of osteomyelitis. I suggested that the work be directed to the patients who couldn't get out of bed, and suggested that the aides should offer to the patients the choice between arts and crafts and academic work. They all chose some book work, some study that would do them good. There were over 400 men working their heads off trying to learn something that would enable them to earn money when they got out.

Previous to the meeting of the Suffolk District Medical Society, the Medical Advisory Committee, appointed to assist the Industrial Accident Board in dealing with purely medical questions, met at the State House for the purpose of conferring with physicians who might want to bring up matters affecting the work done by physicians under the laws governing professional service rendered to injured employees. Also a number of representatives of insurance companies were present by invitation.

Dr. F. J. Cotton, chairman, called the meeting to order and explained the status of this committee, which is that of an unofficial body serving without pay, designed to represent the profession and assist the Industrial Accident Board. The members of this committee were recommended by the medical societies. Dr. Cotton spoke of the general effect of the application of laws, in rehabilitation of injured workmen, and felt that progress is being made and asked the physicians present to submit any evidence of unsatisfactory administration of the Industrial Accident Act, or to ask questions about any doubtful points.

Dr. Jakmauh of South Boston reported that whereas he formerly was called upon to treat many injured workmen, that now he sees very few and felt that patients were being diverted away from their usual medical attendants and sent to physicians in the employ of the corporations or the insurance companies. Dr. Gunning of Fall River felt that physicians should receive more consideration and that there is a somewhat general feeling of disappointment among the physicians of that city because of the employment of nurses to the exclusion of physicians, and also that the selection of physicians had not always been judicious. He criticised the custom of sending nurses to the families of the employees and felt quite sure that doctors were being deprived of legitimate opportunities and further that when doctors are employed that the fees were inadequate and hence a corresponding quality of service was given. One specific criticism of the work done by doctors was that there was a common distribution of aspirin for most troubles and if relief did not follow the aspirin treatment it was supplemented by a dose of salts. These conditions constituted a problem for the medical profession rather than for the Legislature. He affirmed that the insurance companies are destroying medical practice by the employment of unqualified men and paying low fees.

A member of the committee asked for specific evidence that nurses are practising medicine in Fall River, and Dr. Gunning answered that they practically do and that there is evidence in support of this claim. He reported a specific instance of abuse on the part of a mill official

who, on finding that an operative had been to a physician not approved by the management, said that if the operative persisted in this course that he would be discharged. Mr. Holland of Malden reported that nurses are doing the work that should be done by doctors and he felt that the work should not all be done by the selected doctors and that the profession should use its influence in protecting the unselected practitioner.

Dr. Croft of Greenfield reported that workmen were given cards with the names of selected doctors printed thereon, and after the district society had taken the matter up and published information, setting forth the freedom of choice provided for the employee under the law, there was some improvement, but that there is yet much to be done, for financial conditions have changed and that personal freedom should be guaranteed.

Dr. Cross of South Boston felt that the insurance companies do business on wholesale plan and that this condition is responsible for poor work. If a patient reports that he is under the care of a doctor of his own choice that doctor is displaced. He affirmed that in one place a nurse with six months' training was attending cases and is now teaching another nurse to do this class of work.

Dr. Donald Baker of Boston spoke of the methods in vogue in his clinic in dealing with accident cases and asserted that he had no desire to pre-empt the field or to coerce the patient. He felt that among other things the fact that employers often did not provide work for the employee when ready to return to his job is a matter that should be adjusted. So far as he is concerned every effort is being made to keep the patient and his family doctor in their accustomed relation.

Dr. Gunning felt that there could be no objection to the employment of those physicians who did good work, but Dr. Duff of Charlestown endorsed the statement of a previous speaker relating to the directions on the circular given to employees, directing the employment of selected doctors. A physician employed in a candy factory said that she had two good nurses working under her direction and that the nurses desire to know just what the doctors want the nurses to do, because the nurses feel concerned lest they may unwittingly antagonize the doctors.

Mr. Marston, a representative of the American Mutual Insurance Company, claimed that the company is bound under the law to furnish medical care and it is up to the employee to accept.

Dr. Charles L. Scudder, in responding to Dr. Cotton's invitation to speak, said that there is a definite feeling that the relations of the injured employee, the insurance companies and the employers are in an unsettled state. He felt that this class of injuries calls for well-trained men and that the insurance companies are acting as business organizations from a business point of view and therefore are desirous of reducing the period of disability to the shortest possible time. He explained that the slightly different methods of well-trained surgeons would result in practically the same good results. In analyzing the results of treatment the insurance companies ask why in the same type of accidents one man recovers sooner than another, and why one man is out of work longer than another. These companies are looking for standardized treatment and they would probably find that it is less expensive in the long run to pay for adequate treatment.

Dr. Arthur Broughton reviewed some of the activities of the committee of which he was chairman and explained the difficulties encountered. He had tried to have the laws relating to accident insurance clarified in relation to disease modified by or coincident to accidents, the elucidation of the word "unusual" and revision of that part of the law relating to full treatment.

When these recommendations for improvement were presented to the legislative committee, although there was no apparent opposition, the committee report was "leave to withdraw." He explained that he had asked to have his committee dissolved because the work done was a waste of time. He felt that the medical societies have concluded that the attitude of the Industrial Accident Board has been reasonable. So long as such terms as "unusual" are allowed to remain in the law, there will be more or less trouble.

Mr. Linscott, a representative of the Employers Liability Company, said that the interests of the company and the patient are identical. Both want early recovery. The unfortunate position of the company consists in the "post mortem" analysis of the work done by doctors. Some doctors get the patients back into industry promptly and others get poor results, and it is a mistaken idea that the companies want the cheapest service, for poor service means extra compensation. The companies have created clinics only in the larger communities and these take the place of out-patient departments of hospitals, but no patients are forced to go to the company clinics, but the patients soon learn of the advantages of the clinics because of the better equipment than can usually be found in doctors' offices. All that is wanted by the companies is good service and the employed doctors are capable, and any capable doctor is acceptable in places where there are no clinics. It is a common custom to put the name of every doctor in a town on the card of instruction. The greatest trouble results from disinclination to accept the decree of the medical advisory committee and every means is taken to bring pressure to bear on the insurance company. Usually the relations of the doctor and

the insurance company are pleasant and the companies use every effort to dissuade patients from bringing suits against doctors. So far as his company is concerned, he felt that an amendment to the law which would provide for full attendance is desirable and further provision for authority authorizing the employment of competent physicians, for some ignorant workmen cannot exercise good judgment in the selection of a doctor. The companies want to have the patients in the hands of good doctors.

Dr. Ewing of Stoughton felt that it is an endless task to explain the features of the compensation law to patients and felt that it would be of great interest to know how much other people received through the operation of the law as compared with the money paid to doctors. He submitted the following statement:

According to the latest Annual Report of the Department of Industrial Accidents for the year ending June 30, 1921.

There are 36 insurance companies authorized to do business in Massachusetts under the Workmen's Compensation Act.

It appears that this form of insurance covers about 50,000 employers and 1,000,000 employees.

It also appears that among these employees there were 48,315 tabulatable injuries.

It also appears that there was paid in this one-year period, $5,666,859.93; of this, $1,639,670.49 for medical and hospital services; $639,608.26 for fatal cases; $3,387,581.18 for non-fatal cases.

My request is that the report should continue to show, if possible:

1. The total amount paid by the 50,000 employers.

2. The total amount paid the insurance agents, representing the 36 companies, for the service which they perform of selling compensation insurance to employers who are practically obliged, by the law of the State, to buy this insurance.

3. What portion of the total amount received from employers is returned in taxes to the State and Federal Government?

4. What remains in the hands of the insurance company?

5. Also, if it were possible, what it costs the insurance company to transact the business aside from the above items, leaving

6. The final profit which accrues to the 36 insurance companies.

All or any part of the above information would be of interest and eminently fair. The publication of merely a portion of the facts in the annual report leaves one, who desires only the truth, unsatisfied.

EDWARD H. EWING.

Stoughton, Mass.

Mr. Holland of Somerville felt that the general practitioner should give this work over to the clinics.

Dr. Gunning objected to some statements made by Dr. Scudder and the representatives of the insurance companies, for he felt that good judgment had not been exercised in the selection of the doctors in Fall River.

Dr. Broughton regretted that Mr. Linscott, of the insurance company, had left the meeting, for he did not feel at liberty to make certain statements in his absence, but hoped that Mr. Linscott would elaborate his plans at some future time.

Mr. Marston again spoke and expressed the opinion that physicians and the insurance companies are getting together and greater progress will be made if we work together. We must bear in mind that the law has been in existence only ten years and much had to be learned by experience, and experience is expensive. The former plan of getting medical service as cheaply as possible has been discarded. The good features of the law should be recognized, for now every mill employing 100 or more has to have a first-aid room, and whereas the legal profession has lost much the medical profession has gained a great deal in the aggregate.

Dr. Cotton explained that the trouble with the insurance companies had been ignorance and the trouble with the doctors had been inefficiency and the general practitioner cannot keep this class of work if unable to deliver the goods. The clinic will survive if it is efficient. The doctors must realize that insurance companies know a lot about doctors. A great deal has been accomplished and it must be recognized that this kind of work will go into the hands of those competent to deal with it and the mill carrying the financial burden will try to secure the best possible medical service.

Dr. Francis Donoghue asked for comments on the work done by the impartial doctors and explained the method employed in selecting them, which was very much like the plan suggested by a previous speaker.

Dr. Gunning thought that the impartial doctor should be appointed by the Governor, just as medical examiners are appointed.

Dr. Anthony of Haverhill spoke of cutting off compensation before the injured workman was fit to return to industry. This was explained as an infrequent occurrence in the ordinary machinery of business.

Dr. Jakmauh suggested more frequent consultations of the insurance companies with physicians and expressed the hope that publicity would be given to the whole subject through the columns of the BOSTON MEDICAL AND SURGICAL JOURNAL.

Dr. Cotton submitted the following statement:

It is my purpose, unless someone of the Accident Board objects, to bring forward the sug-

gestion which follows, for comment and discussion (but not for action), at the meeting November 22d.

That in all cases still under compensation after three months, brief reports be required to be sent in by the insurer or carrier to the Board; that in case any such reports seem to call for it, an examination and report shall be made by one of the Board's impartial physicians; this in order that

1. Conditions in the given case be definitely established early.
2. There may be a common understanding and agreement as to these conditions on the part of all concerned.
3. The Board may have records, at least of the more serious cases—as they should, beyond question.
4. The impartial physician, if called on, may do his part (acting as consultant as well as reporter) at a time when his work may help toward real results and recovery, instead of having him come in, very often uselessly, after many months, to take part in a case that has become merely a dispute.

This suggestion is offered with the purpose of helping all parties who are working together for more effective administration of the Act and it is hoped that some measure like this may bring about even closer co-operation between the interested parties.

The reasons for bringing forward this suggestion are, in the first place, that impartial examinations are unsatisfactory because necessarily one-sided; that they are professionally unsatisfactory in that the impartial, given no data, cannot do himself justice; in that they are, in the rule, so late as to be of no value, or little value, in the way of helping treatment.

Moreover, there is not a little dissatisfaction in various quarters, for various reasons, with the present arrangement.

Moreover, many patients are incapacitated longer than need be, because early treatment is not instituted.

Not often is this a result of reluctance of insurance companies to do the work. Much oftener cases are lost sight of because no adequate report is at hand or because it is not possible for the insurance company's examiner to reach the case; there would be no obstacle in the way of the Board's examiner.

It is thought that a good many hearings could be avoided under a plan like this, leaving more to be settled by simple conferences without medical dispute; unavoidable medical disagreement might under this plan be reduced to clean-cut issues and submitted after a Board hearing to a medical arbiter on medical issues only, an impartial agreed to by the Board, insurer, and the injured employee.

Subsequent to the open meeting the Advisory Committee met and endorsed the recommendations submitted by Dr. Cotton.

LEADERS ENDORSE CHRISTMAS SEAL SALE.

The Health Christmas Seal Sale of 1922 has been initiated with the encouraging approval of men well known to citizens of Massachusetts, including Major General Clarence R. Edwards; Eugene R. Kelley, M.D., State Commissioner of Public Health; His Eminence, Cardinal O'Connell; and His Honor James M. Curley, Mayor of the City of Boston.

WHAT THE HEALTH CHRISTMAS SEAL DOES IN MASSACHUSETTS.

Helps to support the National and State tuberculosis associations.

Supports the work of thirty county and city tuberculosis and public health associations affiliated with the Massachusetts Tuberculosis League.

Is helping to operate examination clinics in ten of the fourteen counties of the State, and a successful Seal Sale this year will make it possible to place examination clinics within the reach of every town in the State.

Supports twelve full-time expert field tuberculosis nurses and partly supports forty-three other public health nurses.

Supports seven summer health camps and two preventoria for delicate children and gives scores of other delicate children outings in the country.

Has helped to establish four open-air schools during the past three years.

Has helped to establish nutrition work in 100 cities and towns of the State.

Has promoted the Modern Health Crusade, which has enrolled over 300,000 school children in the formation of good health habits.

Has helped to establish dental clinics in fifty-three cities and towns of the State.

Finances the distribution of educational literature, posters, and pamphlets, and helps to conduct "Health Days" and "Health Weeks."

Maintains motion picture and marionette service and a Health Clown for promoting health education.

Publishes the *Health Journal* and promotes health education and interest in public health work through the press of the State.

Coöperates with other agencies in securing good health legislation.

Provides a clearing house for information regarding the organized fight against tuberculosis.

Provides material relief where that is necessary. The little Health Christmas Seal did it.

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THE PROBLEMS OF PSYCHIATRY.

THE attention of our readers is called to the article by Dr. Bronson Crothers in this issue, because it deals with a subject which should interest every general practitioner.

The problems discussed have been considered in several medical society meetings during recent years, but have not seemed to arouse great interest among physicians in general practice. The contention has been made more than once that the vagaries of childhood should be dealt with early in order to prevent morbid mental deviations, and since the regular family attendant is usually the first to observe such deviations, he should realize the importance of early treatment which should, in some cases, be applied to other members of the family as well as the child. The doctor in charge may be quite able to regulate the composite behavior of the family and prevent disaster if he will carefully study all the conditions, or determine the necessity of seeking expert treatment for a case which may be cared for more advantageously by another.

Unfortunately clear evidence of the development of serious mental or moral deviations is often lacking or difficult of interpretation, and it is incumbent on the physician to study this phase of practice just as much as he would prepare himself to detect other dangerous conditions or tendencies.

As Dr. Crothers plainly shows, the statements made by many writers puts the profession on the defensive for, if the oft repeated assertion that a large proportion of our insane population could have been cured by early treatment is true, we owe it to the state, as well as the individual, to prevent many of the tragedies of life.

Although psychiatry may be an undeveloped science, enough has been said and written to put us on our guard and lead to more definite interest in the subject. The majority may not be very much concerned in the controversies of the pioneers except so far as different views are suggestive, but we should endeavor to separate the wheat from the chaff, for out of all the complexities there will come recognized rules of procedure, since the interest of keen minds is now concentrated on the problems involved. Extreme and unsound views will undoubtedly be discarded. Other difficult questions have been solved and we can confidently expect that sane and patient students will clarify the present confusion and establish methods of approach, technic of procedure and give advice which will enable family physicians to deal constructively with indications of psychic disturbances.

The state has taken one forward step in the enactment of a law which obligates the Board of Registration in Medicine to incorporate into examinations questions relating to psychiatry. This, in time, will bear fruit.

Practitioners already registered may devote time to these problems with profit to themselves and their patients.

THE VAGARIES OF INFANT FEEDING.

FEW phases of medicine have been in such a state of flux during the last twenty years as infant feeding. In Boston the percentages have been calculated to a nicety and the babies have done well. Elsewhere (and now in Boston) babies have been fed on whole milk dilutions based on their protein and caloric needs for body weight, and they have done well. Many types of sugars and starches have been used, and the milk protein has been modified by many methods. Buttermilk has been mixed with Karo corn syrup. Milk has been dried and redissolved. It has been peptonized. Protein milk has been used for certain disorders, with and without the addition of sugar.

One of the more recent developments has been that of the butter flour mixture, introduced in 1918 by Czerny and Kleinschmidt. The original formula consists of butter 7 grams, flour 7 grams, cane sugar 5 grams, and water up to 100 c.c., the butter being first cooked, then the flour added, and the two cooked together until brown. The resulting butter soup is mixed with boiled whole milk in varying proportions dependent on the weight of the infant to be fed.

Brown, Courtney, and MacLachlan, in the *American Journal of Diseases of Children*, November, 1922, describe their modification of this mixture, consisting of butter 7¼ teaspoons, cane sugar 5¼ teaspoons, flour 14¾ teaspoons, and water 17½ ounces. This changed butter soup with its higher starch content is also added to whole milk. Excellent results have been obtained by many observers with some type of butter soup feeding, especially in the newborn and in cases of chronic malnutrition and difficult feeding with no particular symptomatology. Its use is advised against in acute conditions and in those where an intolerance to one or more food constituents is present.

The use of boiled butter instead of cream in modified milk formulae is advocated by Dr. Harry Lowenburg, speaking before the Philadelphia Pediatric Society, *Archives of Pediatrics*, October, 1922. He finds that boiling sweet butter for two minutes reduces the fatty acid content by more than half, or to a much greater degree than occurs by boiling cream. Butter so boiled can be added to skimmed milk in considerably greater quantities than can cream, without causing digestive disturbances.

The conclusions that we are forced to reach are that infants thrive on fat, carbohydrate, protein, salts and water, and that the types and quantities of these principles can be varied considerably as to kind and quantity without untoward results, and often with probable benefit. The only warning we would issue is that experiments be kept within the bounds of safety and be not performed by those who are untrained in the art of infant feeding and incompetent to judge their results.

VOX CLAMANTIS.

The American Medical Press of New York, a recently founded publication, voices, in its issue for November, a protest against "The Closed Hospital Menace." It is directed against "the undemocratic institution which excludes all but a chosen few from within the sacred circle constituted by the staff."

The Medical Press, apparently, would have the doors of all hospitals flung open to all practitioners, who could send in their patients at will and treat them according to their own dictates. It has been our experience that physicians who merit confidence generally have no difficulty in being included in some "sacred circle." Possibly those who find themselves unable to gain admittance are not always deserving of the privilege.

In the same issue the Medical Press finds indications of "A startling alliance between the Rockefeller interests and the Hearst publications." This is based on a series of articles written by Paul H. De Kruif, B. S., Ph.D., of the Rockefeller Institute, aimed at proprietary medicines and drugs. Dr. De Kruif is a pathologist and bacteriologist. It is our opinion that a doctor of philosophy is entitled to his title; the Medical Press apparently does not agree with us, since the title of Dr., wherever it occurs before Dr. De Kruif's name, appears in quotation marks.

According to the Medical Press, "The De Kruif propaganda marks another step in the plans of the Rockefeller interests and the American Medical Association to undermine public confidence in the family physician and bring about a popular demand for State medicine."

This is interesting, if true, but we find ourselves unable to become too greatly disturbed by the danger.

News Notes.

Royal Society of Medicine.—In the "Proceedings of the Royal Society of Medicine," for November, 1922, published in London, the Sections of Dermatology, Epidemiology and State Medicine, and Medicine are reported. At the Section of Dermatology meeting, July 20, 1922, cases were shown by various dermatologists. The Section of Epidemiology and State Medicine met April 28, 1922, the paper abstracted being by Frederick Dittman, M.D. Glas., F. R. C. P. Edin., on Some Outbreaks of Enteric Fever due to Carriers of Infection. At the Section of Medicine, May 23, 1922, William Hunter, C. B., M. D., F. R. C. P., read a paper on The Nervous and Mental Disorders of Severe Anaemias in Relation to Their Infective Lesions and Blood Changes.

Death Rate in Boston.—During the week ending Dec. 2, 1922, the number of deaths reported was 235, against 196 last year, with a rate of 16.04. There were 34 deaths under one year of age against 28 last year. The number of cases of principal reportable diseases were: Diphtheria, 60; Scarlet Fever, 29; Measles, 53; Whooping Cough, 50; Typhoid Fever, 3; Tuberculosis, 44. Included in the above were the following cases of non-residents: Diphtheria, 10; Scarlet Fever, 4; Measles, 2; Typhoid Fever, 1; Tuberculosis, 24. Total deaths from these diseases were: Diphtheria, 6; Measles, 3; Typhoid Fever 1; Tuberculosis, 7. Included in the above, were the following cases of non-residents: Diphtheria, 3.

Boston City Hospital.—At a recent meeting of the Surgical Staff of the Boston City Hospital, it was voted to resume operating in the Surgical Amphitheatre on Saturday mornings at ten o'clock.

The Amesbury Hospital.—That Amesbury will have a new hospital in the not very dis-

tant future, seems now an assured fact. A most favorable site has been secured, and the architect will soon submit the plans to the officers of the Amesbury Hospital Association, and also to the local doctors who will constitute the medical staff of the institution. The new hospital is to be erected, equipped and maintained on the community plan. As proposed, it will consist of thirty rooms, including a maternity ward, accident ward, and two large wards—one for men and one for women—operating rooms, and the remainder for private rooms. The officers of the Association are: *President*, C. I. Pettingell. Esq.; *Secretary*, E. J. Graves; *Treasurer*, H. B. Locke.

J. F. R. BIRON, M.D.

THE LAWRENCE MEDICAL CLUB.—The Monthly Meeting of the Club was held Nov. 27th, 1922, with Dr. T. W. Murphy, at the Red Tavern. Chairman for the evening was Dr. H. H. Nevers; subject: "The Work of Dr. Carrel at the Rockefeller Institute," Miss Charlotte Mikalson.

F. H. JENSON, a chiropodist whose advertisement might be construed as indicating that he is a surgeon, was recently brought before the court on complaint of an officer of the Department of Public Safety. He pleaded nolo contendere and the judge placed his case on file with the condition that he should use the term surgeon as a compound word, surgeon-chiropodist. Action against Mr. Jenson was inaugurated by the State Association of Chiropodists for the purpose of compelling practitioners in this field to avoid any form of advertising that might deceive the public.

THE MASSACHUSETTS SOCIETY OF EXAMINING PHYSICIANS.

The November Meeting of the Massachusetts Society of Examining Physicians was held Nov. 27, 1922, following a dinner at the Copley-Plaza Hotel, 35 members being present. The President, Dr. William P. Coues, presided. The general subject of the meeting was "The Human Back," discussed from various angles.

Dr. James W. Sever was the first speaker and he said that the diagnosis of a lame back without demonstrable x-ray findings had to be based purely on subjective symptoms, therefore it was a difficult proposition to determine the amount of the disability. He laid great stress on the importance of having an *immediate x-ray* on every case of injured back, if only as a record, for they often show bony changes which might later be attributed to the accident. He also emphasized the importance of having all cases of back injuries under *proper treatment* and he spoke of the fact that a survey of the cases of back injury which come to the attention of the Massachusetts Industrial Accident Board show that with or without treatment, their time for recovery was six months, and that many of them existed for a very much longer time Dr. Sever accompanied his talk with a number of x-rays shown on the screen, which demonstrated the arthritic changes which may occur in the spine without symptoms and which may cause symptoms after a slight injury. He also showed various cases of fracture of the spine from patients who have recovered after proper treatment.

The second speaker was Dr. Lloyd T. Brown, and his point of view was one largely of posture. He demonstrated by pictures and x-rays 3 distinct types of backs; the flat, broad back; the narrow lithe type and the type which fell in between. It was an interesting fact that the x-ray evidence showed that the very vertebrae were in accord with the type of back as seen in the individual, and from an examination of the x-ray of the back, you could tell to which type its owner belonged. He emphasized strongly the necessity of teaching individuals to stand correctly and the importance of beginning these exercises in childhood. He said that he felt the time would come when individuals in industry would not be allowed to do work for which they were structurally unfit and this sorting process would be carried out scientifically by doctors properly trained.

The discussion of these two papers was opened by Dr. A. W. George, who said there have been and are more loose diagnoses made referable to the vertebrae than any or all parts of the body put together. The medical man and roentgenologist should study the normal, study age and its consequent changes in the vertebrae, study occupation and, last but not least, the mechanics of injury and the conditions that can and can only refer to injury in the vertebrae. He also said that given a workman beyond 40 years of age who has done laborious work throughout the period of his working days, you will find the individual changes entirely different from that found in young workmen. It is rare to find such an individual who does not show some degree of postural changes, scoliosis and subsequent wedging and deformity of the vertebrae, also hypertrophic changes. These latter changes he considers just as much a part of the workman's age as his hair growing gray. As to sacro-iliac dislocation, he said here we have the most frequent back lesion diagnosed today, or in the past, and yet we have rarely any tangible evidence of it from an x-ray point of view.

Dr. Francis D. Donoghue then carried on the discussion and said that the x-ray could never be a substitute for a real medical diagnosis. He felt that there was no definite time for an individual with a lame back to get well

that time of year, age of the individual and the type of work he had been doing must be considered. He said that the orthopedic specialist was too apt to speak in terms of "plaster and eternity instead of braces and work." Dr. Donoghue also said that he considered all men on the level, that they did not loaf unless they had a real injury and that malingering, therefore, was confined to those unable to earn and the diagnosis belongs to those who are "diagnostically destitute."

The last to participate in the discussion was Dr. Frank Schubmehl, of Lynn, who gave some actual experiences in trying to fit men to their positions according to their physical development, and spoke of the difficulties of so doing, particularly in the present industrial situation.

Hilbert F. Day, M.D.

A MERITED HONOR.

A well deserved tribute has been paid to a former Boston physician. The Radiological Society of North America has conferred a gold medal upon Dr. Percy Brown for the pioneer work which he has done in his chosen field. A graduate of the Harvard Medical School in 1900, he turned to x-ray work immediately after completing his interneship at The Boston Children's Hospital. The field was new. The difficulties were great. The dangers involved were unknown. Those who work in the well-equipped x-ray laboratories of the present day cannot realize what it meant to work in a small basement room on Massachusetts Avenue near the old Children's Hospital on Huntington Avenue, which was torn down many years ago. Yet patients had to be sent out in this way to the laboratory started by Codman and continued by Brown because no suitable current could be secured in any other way. Dr. Brown also was instrumental in the establishment of x-ray departments at the Carney and St. Elizabeth's Hospitals. To him and to the lamented Walter Dodd fell the work of instruction in Roentgenology in the Harvard Medical School. They, together with Dr. Williams at the Boston City Hospital, had to be pioneers in the interpretation of plates and in the use of the fluoroscope. Dr. Brown, in spite of the effects upon his health resulting from the work he had done, had no more hesitation than did Dr. Dodd in giving his best first to the British and then to the American forces in the Great War. Fortunately, Dr. Brown did not have to make the supreme sacrifice made so bravely by Dr. Dodd.

Although Dr. Brown is now associated with the Jackson Clinic in Madison, Wisconsin, Boston still claims him. His friends here and everywhere rejoice in the great honor conferred upon him and wish him many years more of useful service.

DR. MacKERROW'S SENTENCE.

The *Worcester Telegram* reports that Chief Justice Walter Perley Hall of the Superior Criminal Court, on Nov. 27, 1922, sentenced Dr. Horace G. MacKerrow to serve not less than four years and not more than five years in the State's Prison at Charlestown, the first day to be in solitary confinement. The crime for which Dr. MacKerrow stands convicted was an assault on a Chinese woman in his office. Up to the time of the complaint Dr. MacKerrow had conducted a successful practice in Worcester for the past seventeen years and was prominent in church and fraternal organizations. His counsel stated that he had signed petitions from at least one thousand prominent Worcester citizens asking for clemency. Although the doctor denied the charge, an alleged confession made to the detective was in evidence. This was explained by the doctor as being the result of confusion at the time.

Obituaries.

JOSEPH GURNEY PINKHAM, M.D.

Dr. Joseph G. Pinkham, for forty years a medical examiner in Essex County, vice-president of the Massachusetts Medical Society in 1909-10, and acting president in the absence abroad of the president, has died at his home in Lynn, at the age of eighty-three, the end coming after an illness of several months, on November 30, 1922.

Born in West Gardiner, Me., Oct. 20, 1839, the son of Elias and Fannie (Sampson) Pinkham, he attended school there and then entered Haverford College in Pennsylvania, where he received the degree of A.B. in 1863 and A.M. in 1866. The degree of M.D. was conferred on him by the Long Island College Hospital in 1866, and in 1868 he came to Lynn, opening an office on Silsbee Street, opposite the site of the present Friends' Church.

For thirty years he was chief surgeon at the Lynn Hospital, was a Fellow of the American College of Surgeons, a consulting surgeon at the State Hospital for Insane at Hathorne, a trustee of the State Hospital at Foxboro, president of the Massachusetts Medico-Legal Society, and president of the Commonwealth Savings Bank. For twelve years he was a member of the Lynn School Board, four years serving as chairman.

He is survived by three daughters and two sons. Dr. Pinkham's wife, who was Georgianna MacKenney, of Maine, died five years ago.

MARSHALL CALKINS, M.D.

Dr. Marshall Calkins, a retired Fellow of the Massachusetts Medical Society, died of old age at his home in Springfield, November 26, 1922, at the great age of ninety-four years. Born September 2, 1828, at Wilbraham, Mass., he attended Wesleyan University at Middletown, Conn., and Union College at Schenectady, N. Y., receiving from the latter the degree of A.B. in 1853 and A.M. in 1856. He studied medicine with Calvin Newton of Worcester and took an M.D. at the Worcester Medical College in 1848 but, not satisfied with this, the college becoming extinct in 1859, he entered Dartmouth Medical School and graduated in medicine twenty years later, in the class of 1868. He settled in practice in Springfield, having joined the State Medical Society in 1862. He was retired in 1893. From 1873 to 1879 Dr. Calkins was professor of physiological and microscopical anatomy in the medical department of the University of Vermont. He was attending physician to the Springfield City Hospital in its early days and later consulting physician to the Springfield Homes for Friendless Women and Children; a member of the board of examining surgeons for pensions. Until recently he was engaged in general practice. Among his memberships were the American Medical Association, Hampden Medical Club, corresponding member Boston Gynecological Society, member Vermont State Medical Society, and American Association for the Advancement of Science.

Dr. Calkins was married in 1855 to Miss Adelaide A. Hosmer, daughter of Gen. E. M. Hosmer of West Springfield. She was a member of the school committee for twelve years and died in 1909. He is survived by his son, Dr. Cheney H. Calkins of Springfield, a Fellow of the Massachusetts Medical Society.

RECENT DEATHS.

DR. HENRY M. SMITH died at his home in Lee at the advanced age of 73 after an illness of several months. He had served as medical examiner and town physician and had held several town offices.

DR. CHARLES WILLIAM GALLOUPE, a Fellow of the Massachusetts Medical Society from 1883 until 1921, when he resigned, died in Boston, November 29, 1922, at the age of sixty-four. He was born in Lynn, May 12, 1858, the son of Dr. Isaac Francis Galloupe, a prominent physician of that city. Charles graduated at Harvard in 1879 and from Harvard Medical School in 1883, serving as surgical house officer at the Massachusetts General Hospital. He had an office on Commonwealth avenue, Boston, for many years.

DR. WALTER EVERETT WHITNEY, a specialist in ophthalmology, otology, laryngology and rhinology, died at the Eastern Maine General Hospital at Bangor, Maine, November 28, 1922 at the age of fifty-seven. He was a graduate of Jefferson Medical College, Philadelphia, in 1893 and had practised in Richmond and Oakland, Maine, before settling in Bangor in 1909.

DR. CHARLES ADELBERT LIBBY, a graduate of the New York Homeopathic Medical College and Flower Hospital in 1873, died in Arlington, his home and place of practice since graduation, November 28, 1922, aged seventy-one. He was a native of Limington, Maine and a member of Hiram lodge, A.F.&A.M., Menotomy Royal Arch Chapter and of Boston Commandery of Knights Templar. He is survived by his widow, who was Miss Mabel Small.

DR. FREDERICK ARTEMAS SIMONDS, a Fellow of the Massachusetts Medical Society, died at his home in Wakefield, of heart disease, at the age of thirty-four. He had been ill for several weeks, the end coming on December 2, 1922.

He was a graduate of the Wakefield High School in 1907, of Tufts College Medical School in 1914, serving as house officer at the Boston City Hospital and practising in Cambridge until becoming a member of the Harvard Unit for service abroad with the British army during the World War. He gave a good account of himself while in the army, was in the aviation corps at one time, and on returning was a member of the Medical Corps of the 101st Infantry. He settled in practice in Wakefield.

Dr. Simonds was a member of the American Legion and a Mason.

The Massachusetts Medical Society.

MEMBERSHIP CHANGES FOR THE MONTH OF NOVEMBER, 1922.

OFFICIAL LIST (10th)

Compiled by the Secretary.

ALPHABETICAL LIST.

The names of the new Fellows, following the examinations of November 2, will be found in the Directory of January 1, 1923.

Adams, Letitia D. Jamaica Plain, office Boston, 82 Commonwealth Ave. (from Suffolk to Norfolk).
Adams, Walter H., from Northampton to Florence, office Northampton, 34 Bridge St.
Ahlstrom, Hjalmar, Quincy, now 96 Garfield St.
Andrews, Robert E., from Ludlow to Springfield, office Ludlow, Ludlow Mfg. Associates.
Auger, Louis L., from Worcester to Montreal, Can., 329 Stuart Ave.
Brown, William James, from Cambridge (Middlesex South) to Boston (Suffolk), 316 Huntington Ave.
Cabot, Richard C., from Boston (Suffolk) to Cambridge (Middlesex South), Emerson Hall, Harvard University.
†*Calkins, Marshall*, died at Springfield, Nov. 26, 1922, aged 94.
Carr, Earl B., from Montrose, Minn., to Silver Creek, N. Y., 37 Oak St.
Chambers, Ralph M., from Westborough to Medford, office Boston, Room 109, State House.
Cobb, Gardner N., Worcester, from 24 Elm St., to 21 High St.
Collins, William J., Northampton, from 150 Main St. to 136 Main St.
Copeland, Elmer H., Northampton, from 168 Elm St. to 200 Elm St.
Cutler, George David, office now Boston, 270 Commonwealth Ave.
Davenport, Bennett F., Watertown, 14 Summit Rd.

Dow, George William, died at Lawrence, Nov. 21, 1922, aged 71.
Faxon, Nathaniel W., from Boston (Suffolk) to Rochester, N. Y., 6 Portsmouth Terrace (non-resident list).
1899 } Gallagher, William Howard, Boston, 91A Court
1922 } Street. Restored by Council, Oct. 4, 1922.
Gilman, Florence, Northampton, now 20 Elm St., Smith College.
Gordon, Samuel F., Philadelphia, Pa., now 206 E. Roosevelt B'lv'd.
†Grainger, William H., from East Boston to Winthrop, 49 Bartlett Road.
Harrington, Elmer J., Holyoke, now 239 Maple St.
Hill, T. Chittenden, Boston, from 31 Bay State Rd. to 270 Commonwealth Ave.
Hubbard, Eliot, Jr., Roxbury, office now Boston, 520 Commonwealth Ave.
Hutton, Willis A., from Shelburne Falls (Franklin) to Swampscott (Essex South), 76 Farragut Rd.
Kaplovitch, Henry, Haverhill. Name changed to Kapp, Henry, 50 Merrimack St.
Koppel, William, from Boston to Chelsea, 199 Chestnut St.
Little, Abby Noyes, Diarbekir, Turkey in Asia, Near East Relief.
Lowry, Franklin P., Newton, now 457 Center St.
Metcalf, Ben H., from Denver, Colo., to Phoenix, Arizona, 391 North 4th Ave.
Miller, Charles Herman, died at Dorchester, November 23, 1922, aged 59.
Morrison, Laurie B., from Boston (Suffolk) to Brookline (Norfolk), office Boston, 370 Marlborough St.
Murray, Halstead G., Framingham, now 45 Newton Place.
O'Connor, Alfred S., Worcester, from 22 Ledge St. to 314 Grafton St.
Perry, Herbert B., from Northampton to Pelham, office Northampton, 55 New South St.
Pinkham, Joseph Gurney, died at Lynn, November 30, 1922, aged 83.
Pratt, John Washburn, died at Dedham, November 17, aged 68.
Ripley, Horace G., from Roxbury (Norfolk) to Brattleboro, Vt., Brattleboro Retreat (non-resident list).
Rowland, William D., from Lynn (Essex South) to Newton (Middlesex South), office Boston, 220 Clarendon St.
Saeger, Ernest T., office now Boston, 270 Commonwealth Ave.
Safford, Wilber Pray, died at Brockton, November 16, 1922, aged 67.
Sawyer, Edward J., Newton, office Boston, 520 Commonwealth Ave.
Smith, George Gilbert, Boston, from No. 352 to No. 7 Marlborough St.
1917 } Smith, Lillian Richardson, Lawrence, 92 Bailey
1922 } St. Readmitted by Censors, Nov. 2, 1922.
Sullivan, Russell F., from New York City to Boston, 240 Newbury St.
Symonds, Alice G., now Churchill, Alice Symonds, Darlings Lake, Yarmouth Co., Nova Scotia.
1892 } Tower, Frederick Russell, Boston, 51 Hunting-
1922 } ton Ave. Restored by Council, Oct. 4, 1922.
Whiteside, George S., from Portland, Oregon, to New Haven, Conn.
Williams, Harold, Boston, from 528 to 535 Beacon St.
Zabriskie, Frank Hunter, died at Greenfield, October 25, 1922, aged 63.

ADDRESSES UNKNOWN.

Bolton, Charles James.
Brown, Fairy Potter Palmer.
Fleury, Oswald Theodore.
Kassees, Saad H. A.
McClintock, Elsie.
MacKnight, William Frank.
Potter, John Claude.
Rabe, Edith Ruth Meek.
Sziklas, Charles.
Wetherbee, Roswell.
Williamson, Cordelia Isabella.

Changes of address should be sent to the Secretary, whose address will be 182 Walnut Street, Brookline 46, Mass., after December 20.

Correspondence.

THE MORTALITY OF DIABETES.

November 27, 1922.

Mr. Editor:

Referring to Hoffman's statistics of the mortality of diabetes, in your issue of July 27, a word of caution as to inferences of incidence ought to be spoken. For instance, the highest mortality per 100,000 is 38.4 for Malta; while the lowest is 1 for Venezuela. Now this does not mean that diabetes is 38.4 times as frequent in Malta as in Venezuela. It would very likely be nearer the truth to say that a case of diabetes in Malta has 38.4 chances of discovery and record to one in Venezuela. Considering that Malta has only about 200,000 inhabitants, and an area of not quite 100 square miles, that it is administered somewhat on the lines of a theoretic benevolent despotism, and that it has been combed over by commissions—mainly for Malta fever—for a generation, the chances of a case of diabetes dying without diagnosis and record are exceedingly minute. In Venezula, on the contrary, a great many deaths occur without any medical observation. To some degree, islands are more amenable to the gathering of statistics than other areas and the table very clearly shows the influence of concentration of population, civilization and medical organization, particularly the last factor. For instance, in the large European medical centers, we find high rates, with Berlin leading. Comparing cities with cities and for the countries including them, we find inconsistencies in incidence that can scarcely be explained except by differences in statistical accuracy. (For example: London 10.3, Edinburg 10.4, Isle of Man 18.1, England and Wales 11.8, Amsterdam 15.9, Holland 12.5, Barcelona 14.9, Madrid 8.8, Spain 5.8). It is possible that more comprehensive statistics would show more definitely differences between city and country, between analogous countries, between different races, between widely different climates, according to dietetic habits, etc. The agreements and divergences in Hoffman's table do not, so far as I can see, demonstrate anything but differences in medical observation and collation of statistics, although there are many tantalizing suggestions that provoke questions as to other factors.

A. L. BENEDICT.

THE SUFFOLK DISTRICT SOCIETIES MEETING ON REHABILITATION.

(Letter by Mr. Joseph A. Parks.)

Boston, Mass., Nov. 27, 1922.

Hilbert F. Day, M.D., 45 Bay State Road,
Boston, Mass.

Dear Doctor:

I have received yours of the 23d and thank you for your kindness in expressing your appreciation to me for the little effort I made at the doctors' meeting the other evening. I assure you it was a pleasure for me to be there and only wish that I had more time to discuss the very important subject of rehabilitation. I was nervous about using up more time than

was allotted to me and did not want to abuse the extraordinary privilege extended to me. At the close of the meeting I should like to have expressed my appreciation to everyone present, particularly to the speakers, for the time and thought which various doctors must have given the subject. It was a grand thing to hear those doctors discuss the best way in which the injured workmen could be assisted and their cases properly handled and made useful members of society. The thing which impressed me most was that all through the entire discussion there seemed to be no thought of "what is there in it for me." The entire keynote of the meeting seemed to be, "how can we help the injured workmen" with no thought as to where the doctor was coming in, financially.

Since that evening, I have felt that I should like to express my thanks in a more public way and felt that they certainly deserve thanks from the injured workmen of Massachusetts and those who will be injured in the future, for the way the medical society in Massachusetts is trying to assist them. I assure you if at any time you should care to have my assistance as a layman, I will gladly give it.

Thanking you for the privilege of being with you on the evening of November 22, I remain,

Sincerely yours,

JOSEPH A. PARKS.

BOSTON CITY HOSPITAL.—Staff Clinical Meeting, Cheever Surgical Amphitheatre, Thursday, December 14, 1922, at 8 P.M. Myocarditis, Francis W. Peabody: Mediastinal Tumors, Henry Jackson Jr.; Spastic and Atonic Constipation, Percy B. Davidson. Open discussion. Physicians and students invited. Refreshments served 9.30 P.M. John J. Dowling, *Superintendent.*

BOSTON MEDICAL HISTORY CLUB.—Meeting at Boston Medical Library, Monday, December 18, at 8.15 P.M. The proposed amendment to the constitution whereby the annual meeting will be changed from December to April will be voted upon.

Dr. Robert M. Green will read on "The Early History of Medical Journalism in New England." In commemoration of the centenary of the birth of Pasteur (Dec. 27, 1822) Drs. Harvey Cushing, L. J. Henderson and M. J. Rosenau will speak. Dr. M. Storer will show the Pasteur medals in the Storer Collection and there will be an exhibition of Pasteur's works. By vote at the last meeting future meetings will be held on the third Monday of the month, viz. January 15, February 19, March 19, April 16. Please make note of these dates.—John W. Cumnin, *Secretary.*

SOCIETY MEETINGS.

DISTRICT SOCIETIES.

A list of society meetings is herewith published. This list will be changed on information furnished by the secretaries of the societies, and will appear in each issue.

Barnstable District:—Hyannis,—February 2, 1923, (Annual Meeting)—May 4, 1923.

Bristol South District:—Fall River,—May 3, 1923.

Essex North District:—Haverhill, (Semi-Annual Meeting)—January 3, 1923. Y. M. C. A. Building, Lawrence, (Annual Meeting)—May 2, 1923.

Meetings of the Suffolk District and the Boston Medical Library, at the Library:

December 27, 1922:—Surgical Meeting. "Surgical Lesions Occurring in Diabetics: Their Peculiarities and Management," Dr. Elliott P. Joslin, Boston. An account of the experience in this field of the major hospitals of Boston, by members of the staffs.

January 31, 1923:—Medical Meeting. "Epidemic Encephalitis," Dr. E. W. Taylor, Boston.

February 28, 1923:—Medical Meeting. "Colitis," Dr. Henry F. Hewes, Boston.

March 28, 1923:—Surgical Meeting. "A Review of What Surgery Can Accomplish in Diseases of the Thoracic Organs, with a Forecast of the Future," Dr. Howard Lilienthal of New York.

April 25, 1923:—Annual Meeting. Election of Officers. "The Record of the Past Twelve Years in Syphilology, with a Forecast of the Future." A series of 10-minute papers. Dr. C. Morton Smith, Boston, will preside.

The Springfield Academy of Medicine meets the second Tuesday of each month. Schedule of speakers includes the following names: Dr. Alexis Carrel, Dr. W. B. Long, Dr. J. W. Williams, Dr. W. S. Thayer, and Dr. Barton Cooke, Hist. The date for each speaker has not been assigned.

Middlesex North District:—Meeting, Wednesday, January 31, 1923.

Middlesex East District—Jan. 24, 1923. The Nursing Problem. Speaker to be announced later.

March 21, 1923. Mental Factors in Childhood. Paper by Dr. William Healy.

April 18, 1923. Interpretation of Laboratory Findings. Papers by Dr. E. G. Crabtree and one to be announced later.

May 9, 1923. Annual Meeting.

All meetings except the annual meeting will be held at the Harvard Club in Boston. A. E. Small, Secretary.

Worcester District Meetings are scheduled as follows:

January 10, 1923:—The meeting will be held at the Worcester State Hospital, Belmont Street, at 4.15 P.M. Programme: "A Discussion of Status Thymico-Lymphaticus and the Inherent Compensatory Possibilities," Dr. Walter Timme, New York City. Discussion will be opened by Dr. W. A. Bryan.

February 14, 1923:—The meeting will be held at the Worcester City Hospital at 4.15 P.M. The programme will consist of a series of papers by members of the staff.

March 14, 1923:—The meeting will be held at St. Vincent's Hospital at 8.15 P.M. The programme will consist of a series of papers by members of the staff.

April 11, 1923:—The meeting will be held at Memorial Hospital at 8.15 P.M., and the programme will consist of a series of papers by members of the staff.

May 9, 1923:—Annual meeting and banquet.

STATE, INTERSTATE AND NATIONAL SOCIETIES.

December 26-30, 1922:—American Association for Advancement of Science meets in Boston.

December, 1922:—Boston Medical History Club will meet December 18, 1922.

January, 1923:—Massachusetts Society of Examining Physicians (date and place undecided); Hilbert F. Day, Secretary. Massachusetts Association of Boards of Health, January 25, Annual Meeting, Boston; W. H. Allen, Mansfield, Mass., Secretary.

January, 1923:—Boston Association of Cardiac Clinics. Meeting January 18, 1923, at 8:15 P.M. Boston Lying-In Hospital (New Hospital). Subject: Pregnancy and Heart Disease.

January, 1923:—Boston Medical History Club will meet January 15, 1923.

February, 1923:—New England Dermatological Society Meeting, February 14, 1923, at 3.30 P. M., in the Skin Out-Patient Department, Massachusetts General Hospital; C. Guy Lane, Secretary.

February, 1923:—Boston Medical History Club will meet the third Monday of this month.

March, 1923:—Massachusetts Society of Examining Physicians (date and place undecided); Hilbert F. Day, Secretary.

March, 1923:—Boston Association of Cardiac Clinics. Meeting March 15, 1923, at 8:15 P.M. Boston City Hospital. Subject: Prevention and Relief of Heart Failure.

March, 1923:—Boston Medical History Club will meet the third Monday of this month.

April, 1923:—New England Dermatological Society Meeting, April 11, 1923, at 3.30 P. M., in the Surgical Amphitheatre, Boston City Hospital; C. Guy Lane, Secretary. Massachusetts Association of Boards of Health, April 26, 1923, Boston; W. H. Allen, Mansfield, Mass., Secretary.

April, 1923:—Boston Medical History Club will meet the third Monday of this month.

May, 1923:—Massachusetts Society of Examining Physicians (date and place undecided). American Pediatric Society Meeting, May 31, June 1 and 2, 1923, at French Lick Springs Hotel, French Lick, Ind.; H. C. Carpenter, Secretary.

May, 1923:—Boston Association of Cardiac Clinics. Meeting May 17, 1923, at 8:15 P.M. Children's Hospital. Subject: Rheumatism and Chorea and Heart Disease.

June, 1923:—American Medical Association, San Francisco, June 25-29, 1923; Alexander R. Craig,* Chicago, Ill., Secretary.

July, 1923:—Massachusetts Association of Boards of Health, July 26, Nantasket; W. H. Allen, Mansfield, Mass., Secretary.

*Deceased September 2, 1922.